DRAFT

ENVIRONMENTAL IMPACT REPORT

FOR THE

OAKWOOD LANDING –
CERRI & DENALI SUBDIVISIONS

(SCH: 2016082046)

JULY 2017

Prepared for:

Manteca Community Development Department, Planning Division
1001 West Center Street
Manteca, CA 95337
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Prepared by:

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De Novo Planning Group

A Land Use Planning, Design, and Environmental Firm

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Appendix D: Noise Report
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INTRODUCTION

The City of Manteca has determined that the Oakwood Landing – Cerri & Denali Subdivisions Project is a "Project" within the definition of CEQA. CEQA requires the preparation of an environmental impact report (EIR) prior to approving any project, which may have a significant impact on the environment. For the purposes of CEQA, the term "Project" refers to the whole of an action, which has the potential for resulting in a direct physical change or a reasonably foreseeable indirect physical change in the environment (CEQA Guidelines Section 15378[a]).

The EIR contains a description of the project, description of the environmental setting, identification of project impacts, and mitigation measures for impacts found to be significant, as well as an analysis of project alternatives, identification of significant irreversible environmental changes, growth-inducing impacts, and cumulative impacts. This EIR identifies issues determined to have no impact or a less than significant impact, and provides detailed analysis of potentially significant and significant impacts. Comments received in response to the NOP were considered in preparing the analysis in this EIR.

PROJECT DESCRIPTION

The Project site comprises approximately 258.29 acres of land. The Project site is bounded on the north by an existing dirt roadway between Bronzan Road and Atherton Drive, on the east by South McKinley Avenue and an existing residential subdivision, on the south by existing agricultural fields, and on the west by existing agricultural fields and the future Atherton Drive right-of-way. The proposed Project is primarily a residential development anticipated to provide up to 290 high density residential units and up to 975 low density residential units. Additionally, the proposed Project includes 13.0 acres of general commercial uses anticipated to provide up to approximately 237,838 square feet of commercial. The Project would provide approximately 16.06 acres of parkland and would maintain approximately 6.77 acres of open space.

The Project also includes expansion of the existing vehicular and non-vehicular circulation system and utility improvements. The proposed Project does not include a detailed site plan for the general commercial or high density residential areas. The general commercial or high density residential lands would ultimately require Site Plan review approval by the City prior to any development on these portions of the Project site.

The proposed Project would require a General Plan amendment to change land uses on the Project site. Changes to the Land Use Element would include changing approximately 121.67 acres of BIP to LDR uses; changing approximately 70.0 acres of UR-BIP to LDR uses; changing approximately 9.39 acres of UR-VLDR to LDR uses; changing approximately 23.41 acres of CMU to LDR uses; changing approximately 11.59 acres of BIP to HDR uses; maintaining approximately 13.0 acres as GC; and maintaining approximately 6.77 acres of OS. It is noted that parks would be permitted within the proposed LDR uses. Figure 2.0-6 illustrates the current Manteca General Plan land uses within the Project site. The land uses as proposed are not consistent with the Manteca Zoning Code and, thus, the proposed Project would require a City of Manteca Zoning Amendment to

change land uses on the Project site. Changes to the Zoning Map would include changing approximately 79.39 acres of UND to R-1 uses; changing approximately 121.67 acres of BIP to R-1 uses; changing approximately 23.41 acres of CMU to R-1 uses; approximately 11.59 acres of BIP to R-3 uses; maintaining approximately 13.0 acres as CG; and maintaining approximately 6.77 acres of OS.

The proposed Project was developed by private sector developers who are proposing to design and build the subdivisions and future multi-family housing and commercial developments. The quantifiable objectives of the proposed Project include development of the 258.29-acre Project site, which will include: Low Density Residential, High Density Residential, General Commercial, and Open Space.

AREAS OF CONTROVERSY AND ISSUES TO BE RESOLVED

This Draft EIR addresses environmental impacts associated with the proposed Project that are known to the City of Manteca, were raised during the Notice of Preparation (NOP) process, or raised during preparation of the Draft EIR. This Draft EIR discusses potentially significant impacts associated with aesthetics, agricultural resources, air quality, biological resources, cultural resources, geology, soils, and mineral resources, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, land use and population, housing, noise, public services and recreation, transportation and circulation, and utilities.

The City of Manteca received written comment letters on the NOP for the proposed Project. A copy the letters are provided in Appendix A of this Draft EIR. The commenting agency/citizen is provided below. The City also held a public scoping meeting on September 14, 2016. No written or verbal comments were provided at that scoping meeting.

- California Department of Transportation, District 10;
- California Water Boards, Central Valley Regional Water Quality Control Board;
- City of Lathrop;
- Department of California Highway Patrol, Stockton Area;
- Manteca Unified School District;
- Native American Heritage Commission;
- RLC Associates;
- San Joaquin County Environmental Health Department; and
- Terra Land Group, LLC.

ALTERNATIVES TO THE PROPOSED PROJECT

The CEQA Guidelines require an EIR to describe a reasonable range of alternatives to the project or to the location of the project which would reduce or avoid significant impacts, and which could feasibly accomplish the basic objectives of the proposed project. Three alternatives to the proposed Project were developed based on input from City staff and the technical analysis performed to identify the environmental effects of the proposed Project. The alternatives analyzed in this EIR include the following three alternatives in addition to the proposed Project.

- **No Project (No Build) Alternative**: Under this alternative, development of the project site would not occur, and the project site would remain in its current existing condition.

- **Increased Density Alternative:** Under this alternative, the proposed project would be developed with the same amenities as described in the Project Description, but the density of the residential uses would be increased.

- **Agriculture Protection Alternative:** Under this alternative, the proposed project would be developed in such a way to protect those lands currently identified as prime farmland and farmland of statewide importance, by reducing the overall footprint of the developed areas to a greater extent than the reduced project alternative.

Alternatives are described in detail in Chapter 5. Table ES-1 provides a comparison of the alternatives using a qualitative matrix that compares each alternative relative to the other project alternatives. As shown in the table, the No Project (No Build) Alternative is the environmentally superior alternative. However, as required by CEQA, when the No Project (No Build) Alternative is the environmentally superior alternative, the environmentally superior alternative among the others must be identified. Therefore, the Increased Density and Agricultural Protection Alternatives both rank higher than the proposed Project. Comparatively, the Agricultural Protection Alternative would result in less impact then the Increased Density Alternative because it provides the greatest reduction of potential impacts in comparison to the proposed Project. It should be noted that the Agricultural Protection Alternative and Increased Density Alternative do not meet all of the Project objectives.

TABLE ES-1: COMPARISON SUMMARY OF ALTERNATIVES TO THE PROPOSED PROJECT

ENVIRONMENTAL ISSUE	*NO PROJECT (NO BUILD) ALTERNATIVE*	*INCREASED DENSITY ALTERNATIVE*	*AGRICULTURE PROTECTION ALTERNATIVE*
Aesthetics and Visual Resources	Less (Best)	Less (3rd Best)	Less (2nd Best)
Agricultural Resources	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Air Quality	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Biological Resources	Less (Best)	Less (3rd Best)	Less (2nd Best)
Cultural and Tribal Resources	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Geology, Soils, and Mineral Resources	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Greenhouse Gases and Climate Change	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Hazards and Hazardous Materials	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Hydrology and Water Quality	Less (Best)	Less (3rd Best)	Less (2nd Best)
Land Use, Population, and Housing	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Noise	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Public Services and Recreation	Less (Best)	Less (3rd Best)	Less (2nd Best)
Transportation and Circulation	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Utilities	Less (Best)	Equal (3rd Best)	Less (2nd Best)

GREATER = GREATER IMPACT THAN THAT OF THE PROPOSED PROJECT
LESS = LESS IMPACT THAN THAT OF THE PROPOSED PROJECT
EQUAL = NO SUBSTANTIAL CHANGE IN IMPACT FROM THAT OF THE PROPOSED PROJECT

SUMMARY OF IMPACTS AND MITIGATION MEASURES

In accordance with the CEQA Guidelines, this EIR focuses on the significant effects on the environment. The CEQA Guidelines defines a significant effect as a substantial adverse change in the physical conditions which exist in the area affected by the proposed project. A less than significant effect is one in which there is no long or short-term significant adverse change in environmental conditions. Some impacts are reduced to a less than significant level with the implementation of mitigation measures and/or compliance with regulations.

The environmental impacts of the proposed project, the impact level of significance prior to mitigation, the proposed mitigation measures and/or adopted policies and standard measures that are already in place to mitigate an impact, and the impact level of significance after mitigation are summarized in Table ES-2.

TABLE ES-2: PROJECT IMPACTS AND PROPOSED MITIGATION MEASURES

ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
AESTHETICS AND VISUAL RESOURCES			
Impact 3.1-1: Project implementation may result in substantial adverse effects on scenic vistas and resources or substantial degradation of visual character.	PS		SU
Impact 3.1-2: Project implementation may substantially damage scenic resources within a State Scenic Highway.	LS		--
Impact 3.1-3: Project implementation may result in light and glare impacts.	PS	***Mitigation Measure 3.1-1:*** *A lighting plan for all non-residential parcels shall be prepared prior to the approval of the Site Plan review for each phase. The lighting plan shall demonstrate that the lighting systems and other exterior lighting throughout the commercial and industrial portions of the Project site have been designed to minimize light spillage onto adjacent properties to the greatest extent feasible.*	LS
AGRICULTURAL RESOURCES			
Impact 3.2-1: The proposed Project has the potential to result in the conversion of Farmlands, including Prime Farmland and Farmland of Statewide Importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural uses.	PS	***Mitigation Measure 3.2-1:*** *Prior to the conversion of important farmland on the Project site, the Project applicant shall participate in the City's agricultural mitigation fee program and the SJMSCP by paying the established fees on a per-acre basis for the loss of important farmland. Fees paid toward the City's program shall be used to fund conservation easements on comparable or better agricultural lands to provide compensatory mitigation.*	SU

CC – cumulatively considerable *LCC – less than cumulatively considerable* *LS – less than significant*

PS – potentially significant *B – beneficial impact* *SU – significant and unavoidable*

ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
Impact 3.2-2: The proposed Project has the potential to conflict with existing zoning for agricultural use, or Williamson Act Contracts.	LS		--
Impact 3.2-3: The proposed Project has the potential to result in conflicts with adjacent agricultural lands or indirectly cause conversion of agricultural lands.	PS	***Mitigation Measure 3.2-2:*** *Prior to approval of improvement plans for each phase of the Project, the Project applicant shall demonstrate that the Project site plans include adequate measures to buffer adjacent agricultural uses from urban uses on the Project site and to reduce adverse impacts to neighboring agricultural uses. Such measures shall include, but not be limited to:* • *The Project shall provide adequate and secure fencing at the interface of the Project site, or any individual phase of the Project, and adjacent agricultural uses.* • *The Project shall provide buffers, which may include parking areas, roadways and streets, drainage channels, and landscaped corridors, to buffer adjacent agricultural uses from the Project, including any individual phase of the Project, from proposed urban uses.* • *The Project shall provide notifications to all operators of uses on the Project site that are adjacent or in the vicinity of existing agricultural land of the City's Right-to-Farm Ordinance.*	LS
AIR QUALITY			
Impact 3.3-1: Project operation has the potential to cause a violation of an air quality standard or contribute substantially to an existing or projected air quality violation.	PS	***Mitigation Measure 3.3-1****: Prior to final approval of improvement plans, the Project proponent shall submit an Air Impact Assessment (AIA) application to the San Joaquin Valley Air Pollution Control District for District Rule 9510 Indirect Source Review (ISR) to obtain AIA approval from the District for the phase or Project component that is to be constructed. Prior to the issuance of a building permit of each individual phase or Project component, the Project proponent shall incorporate mitigation measures into the proposed Project and demonstrate compliance with District Rule 9510 including payment*	SU

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ENVIRONMENTAL IMPACT	LEVEL OF SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURE	RESULTING LEVEL OF SIGNIFICANCE
		of all fees. ***Mitigation Measure 3.3-2****: Prior to the approval of improvement plans, the Project proponent shall incorporate the following features into Project plans:* • *Bus turnouts and transit improvements where requested by the San Joaquin RTD.* • *Continuous public sidewalks and/or multi-use trails adjacent to all proposed public streets.* • *Pavement and striping for bike lanes/paths.* • *Street lighting.* • *Pedestrian signalization, signage and safety designs at signalized intersections.* • *Shade trees to shade sidewalks in street-side landscaping areas.* ***Mitigation Measure 3.3-3****: Prior to the approval of improvement plans for non-residential projects, the Project proponent shall prepare and implement a transportation demand management (TDM) plan for the non-residential portions of the Project that includes, but is not limited to, the following measures subject to the review and approval of the City of Manteca:* • *Provide secure bicycle parking in conjunction with the non-residential portion of the Project.* • *Provide on-site amenities that encourage alternative transportation modes such as locker, shower, and secure bike storage facilities.* • *Coordinate SJCOG's Commute Connection Program.*	
Impact 3.3-2: Project construction has the potential to cause a violation of an air quality standard or contribute substantially to an existing or projected air quality violation.	PS	***Mitigation Measure 3.3-4:*** *Prior to the commencement of construction activities, the project proponent shall prepare and submit a Dust Control Plan that meets all of the applicable requirements of APCD Rule 8021, Section 6.3, for the review and approval of the APCD Air Pollution Control Officer.* ***Mitigation Measure 3.3-5:*** *During all construction activities, the project proponent shall*	LS

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ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
		implement dust control measures, as required by APCD Rules 8011-8081, to limit Visible Dust Emissions to 20% opacity or less. Dust control measures shall include application of water or chemical dust suppressants to unpaved roads and graded areas, covering or stabilization of transported bulk materials, prevention of carryout or trackout of soil materials to public roads, limiting the area subject to soil disturbance, construction of wind barriers, and access restrictions to inactive sites as required by the applicable rules. ***Mitigation Measure 3.3-6:*** *During all construction activities, the project proponent shall implement the following dust control practices identified in Tables 6-2 and 6-3 of the GAMAQI (San Joaquin Valley APCD, 2002).* *a) All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, or vegetative ground cover.* *b) All on-site unpaved roads and off-site unpaved access roads shall be effectively stabilized of dust emissions using water or chemical stabilizer/suppressant.* *c) All land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities shall control fugitive dust emissions by application of water or by presoaking.* *d) When materials are transported off-site, all material shall be covered, effectively wetted to limit visible dust emissions, or at least six inches of freeboard space from the top of the container shall be maintained.* *e) All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at least once every 24 hours when operations are occurring. The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. Use of blower devices is expressly forbidden.* *f) Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/suppressant.*	

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		g) Limit traffic speeds on unpaved roads to 5 mph; and *h) Install sandbags or other erosion control measures to prevent silt runoff to public roadways from sites with a slope greater than one percent.* ***Mitigation Measure 3.3-7:*** *Architectural coatings applied to all structures in the Project site shall meet or exceed volatile organic compound (VOC) standards set in APCD Rule 4601. The ODS shall submit to the APCD a list of architectural coatings to be used and shall indicate how the coatings meet or exceed VOC standards. If the APCD determines that any architectural coatings do not meet VOC standards, the ODS shall replace the identified coatings with those that meet standards.* ***Mitigation Measure 3.3-8:*** *Asphalt paving shall be applied in accordance with APCD Rule 4641. This rule applies to the manufacture and use of cutback asphalt, slow cure asphalt and emulsified asphalt for paving and maintenance operations.*	
Impact 3.3-3: The proposed Project has the potential to have carbon monoxide hotspot impacts.	LS		--
Impact 3.3-4: The proposed Project has the potential for public exposure to toxic air contaminants.	LS		--
Impact 3.3-5: The proposed Project has the potential for exposure to odors.	LS		--
BIOLOGICAL RESOURCES			
Impact 3.4-1: The proposed Project has the potential to have a direct or indirect effect on special-status invertebrate species.	LS	***Mitigation Measure 3.4-1****: Prior to commencement of any grading activities, the Project proponent shall seek coverage under the SJMSCP to mitigate for habitat impacts to covered special status species. Coverage involves compensation for habitat impacts on covered species through implementation of incidental take and minimization Measures*	--

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		(ITMMs) and payment of fees for conversion of lands that may provide habitat for covered special status species. These fees are used to preserve and/or create habitat in preserves to be managed in perpetuity. Obtaining coverage for a Project includes incidental take authorization (permits) under the Endangered Species Act Section 10(a), California Fish and Game Code Section 2081, and the MBTA. Coverage under the SJMSCP would fully mitigate all habitat impacts on covered special-status species.	
Impact 3.4-2: The proposed Project has the potential to have direct or indirect effects on special-status reptile and amphibian species.	LS		--
Impact 3.4-3: The proposed Project has the potential to have direct or indirect effects on special-status bird species.	LS		--
Impact 3.4-4: The proposed Project has the potential to result in direct or indirect effects on special-status mammal species.	LS		--
Impact 3.4-5: The proposed Project has the potential for direct or indirect effects on candidate, sensitive, or special-status plant species.	LS		--
Impact 3.4-6: The proposed Project has the potential to effect protected wetlands and jurisdictional waters.	PS	***Mitigation Measure 3.4-2:*** *Prior to any construction activities that would disturb the irrigation basin (Irrigation Ditch #4 from Oakwood Trails), the Project applicant shall obtain authorization for fill from the regulatory agencies (USACE-404 permit, RWQCB-401 certification, 1600 Streambed Alteration Agreement). All requirements of a permit shall be adhered to throughout the construction phase.*	LS

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Impact 3.4-7: The proposed Project has the potential to result in adverse effects on riparian habitat or a sensitive natural community.	LS		--
Impact 3.4-8: The proposed Project has the potential to result in interference with the movement of native fish or wildlife species or with established wildlife corridors, or impede the use of native wildlife nursery sites.	LS		--
Impact 3.4-9: The proposed Project has the potential to conflict with an adopted Habitat Conservation Plan.	LS		--
Impact 3.4-10: The proposed Project has the potential to conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	LS		--
CULTURAL AND TRIBAL RESOURCES			
Impact 3.5-1: Project implementation has the potential to cause a substantial adverse change to a significant historical resource, as defined in CEQA Guidelines §15064.5, or a significant tribal cultural resource, as defined in Public Resources Code §21074.	PS	***Mitigation Measure 3.5-1:*** *If any cultural resources, including prehistoric or historic artifacts, or other indications of archaeological resources are found during grading and construction activities, all work shall be halted immediately within a 200-foot radius of the discovery until an archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards in prehistoric or historical archaeology, as appropriate, has evaluated the find(s).* *Work shall not continue at the discovery site until the archaeologist conducts sufficient research and data collection to make a determination that the resource is either 1) not cultural in origin; or 2) not potentially significant or eligible for listing on the NRHP or CRHR; or 3) not a significant Public Trust Resource.*	LS

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		If Native American resources are identified, a Native American monitor, following the Guidelines for Monitors/Consultants of Native American Cultural, Religious, and Burial Sites established by the Native American Heritage Commission, may also be required and, if required, shall be retained at the Applicant's expense.	
Impact 3.5-2: Project implementation has the potential to cause a substantial adverse change to a significant archaeological resource, as defined in CEQA Guidelines §15064.5.	PS	*Implement* ***Mitigation Measure 3.5-1***	LS
Impact 3.5-3: Project implementation has the potential to directly or indirectly destroy a unique paleontological resource.	PS	***Mitigation Measure 3.5-2:*** *If paleontological resources are discovered during the course of construction, work shall be halted immediately within 50 meters (165 feet) of the discovery, the City of Manteca shall be notified, and a qualified paleontologist shall be retained to determine the significance of the discovery. If the paleontological resource is considered significant, it should be excavated by a qualified paleontologist and given to a local agency, State University, or other applicable institution, where they could be curated and displayed for public education purposes.*	LS
Impact 3.5-4: Project implementation has the potential to disturb human remains, including those interred outside of formal cemeteries.	PS	***Mitigation Measure 3.5-3:*** *If human remains are discovered during the course of construction, work shall be halted at the site and any nearby area reasonably suspected to overlie adjacent human remains until he San Joaquin County Coroner has been informed and has determined that no investigation of the cause of death is required. If the remains are of Native American origin, either of the following steps will be taken:* • *The coroner will contact the Native American Heritage Commission in order to ascertain the proper descendants from the deceased individual. The coroner will make a recommendation to the landowner or the person responsible for the excavation work, for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods, which may include obtaining a qualified archaeologist or team of archaeologists to properly excavate the human remains.* • *The landowner shall retain a Native American monitor, and an archaeologist, if recommended by the Native American monitor, and rebury the Native American*	LS

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		human remains and any associated grave goods, with appropriate dignity, on the property and in a location that is not subject to further subsurface disturbance when any of the following conditions occurs: ○ *The Native American Heritage Commission is unable to identify a descendent.* ○ *The descendant identified fails to make a recommendation.* ○ *The City of Manteca or its authorized representative rejects the recommendation of the descendant, and the mediation by the Native American Heritage Commission fails to provide measures acceptable to the landowner.*	
GEOLOGY, SOILS, AND MINERAL RESOURCES			
Impact 3.6-1: The proposed Project may expose people or structures to potential substantial adverse effects involving strong seismic ground shaking or seismic related ground failure.	LS		--
Impact 3.6-2: Implementation and construction of the proposed Project may result in substantial soil erosion or the loss of topsoil.	LS	***Mitigation Measure 3.6-1:*** *Prior to clearing, grading, and disturbances to the ground such as stockpiling, or excavation, the Project proponent shall submit a Notice of Intent (NOI) and Storm Water Pollution Prevention Plan (SWPPP) to the RWQCB to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit Order 2009-0009-DWQ amended by 2010-0014-DWQ & 2012-0006-DWQ). The SWPPP shall be designed with Best Management Practices (BMPs) that the RWQCB has deemed as effective at reducing erosion, controlling sediment, and managing runoff. These include: covering disturbed areas with mulch, temporary seeding, soil stabilizers, binders, fiber rolls or blankets, temporary vegetation, and permanent seeding. Sediment control BMPs, installing silt fences or placing straw wattles below slopes, installing berms and other temporary run-on and runoff diversions. These BMPs are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed. Final selection of BMPs will*	--

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		be subject to approval by City of Manteca and the RWQCB. The SWPPP will be kept on site during construction activity and will be made available upon request to representatives of the RWQCB.	
Impact 3.6-3: The proposed Project has the potential to be located on a geologic unit or soil that is unstable, or that would become unstable as a result of project implementation, and potentially result in landslide, lateral spreading, subsidence, liquefaction or collapse.	PS	***Mitigation Measure 3.6-2:*** *Prior to earthmoving activities, a certified geotechnical engineer, or equivalent, shall be retained to perform a final geotechnical evaluation of the soils at a design-level as required by the requirements of the California Building Code Title 24, Part 2, Chapter 18, Section 1803.1.1.2 related to expansive soils and other soil conditions. The evaluation shall be prepared in accordance with the standards and requirements outlined in California Building Code, Title 24, Part 2, Chapter 16, Chapter 17, and Chapter 18, which addresses structural design, tests and inspections, and soils and foundation standards. The final geotechnical evaluation shall include design recommendations to ensure that soil conditions do not pose a threat to the health and safety of people or structures, including threats from liquefaction or lateral spreading. The grading and improvement plans, as well as the storm drainage and building plans shall be designed in accordance with the recommendations provided in the final geotechnical evaluation.*	LS
Impact 3.6-4: Potential for expansive soils to create substantial risks to life or property.	PS	*Implement* ***Mitigation Measure 3.6-2***	LS
Impact 3.6-5: Potential for existing soils to be incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.	LS		--
Impact 3.6-6: Potential to result in the loss of a known mineral resource that would be of value to the region.	LS		--

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Impact 3.6-7: Potential to result in the loss of a locally important mineral resource recovery site delineated on a local general plan.	LS		--
GREENHOUSE GASES AND CLIMATE CHANGE			
Impact 3.7-1: Potential to generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment or potential to conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.	PS	***Mitigation Measure 3.7-1****: To reduce Greenhouse Gas Emissions and Energy Consumption, the Project applicant shall institute measures to reduce wasteful, inefficient, and unnecessary consumption of energy during construction, operation, and maintenance/landscaping. As the individual phases are designed and undergo Design/Site Plan Review by the City of Manteca, there should be an explanation as to why certain measures were incorporated in the individual phases and why other measures were dismissed. The measures to reduce wasteful, inefficient, and unnecessary consumption of energy during construction, operation, and maintenance/landscaping include the following:* • *Increase transit accessibility in the Project area by ensuring a minimum distance of 0.9 miles to transit stops* • *Ensure that the pedestrian network within the Project area connects to offsite pedestrian networks* • *Provide traffic calming measures on all street segments and intersections* • *Exceed Title 24 by 15 percent* • *Install high efficiency lighting and appliance within all buildings* • *Install low-flow faucets, toilets, and showers as applicable* • *Use water-efficient irrigation systems throughout the Project area*	SU
Impact 3.7-2: Cumulative impact on climate change from increased Project-related greenhouse gas emissions.	PS	*Implement* ***Mitigation Measure 3.7-1***	CC and SU
Impact 3.7-3: Project implementation may result in the inefficient, wasteful, or unnecessary use of energy resources.	LS		--

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HAZARDS AND HAZARDOUS MATERIALS			
Impact 3.8-1: Potential to create a significant hazard through the routine transport, use, or disposal of hazardous materials or through the reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.	PS	***Mitigation Measure 3.8-1:*** *A Soils Management Plan (SMP) shall be submitted and approved by the San Joaquin County Department of Environmental Health prior to the issuance of a grading permit. The SMP shall establish management practices for handling hazardous materials, including fuels, paints, cleaners, solvents, etc., during construction. The approved SMP shall be posted and maintained onsite during construction activities and all construction personnel shall acknowledge that they have reviewed and understand the plan.* ***Mitigation Measure 3.8-2:*** *The applicant shall hire a qualified consultant to perform additional testing prior to the issuance of grading permits or demolition permits for construction activities in the following areas that have been deemed to have potential hazardous conditions present:* • *The remnant construction and/or farming materials (i.e. remnant pipes, etc.).* • *The soils in the area where farming equipment and above ground tanks have been used.* *The intent of the additional testing is to investigate whether any of the buildings, facilities, or soils contain hazardous materials. If asbestos-containing materials and/or lead are found in the buildings, a Cal-OSHA certified ACBM and lead based paint contractor shall be retained to remove the asbestos-containing materials and lead in accordance with EPA and California Occupational Safety and Health Administration (Cal/OSHA) standards. In addition, all activities (construction or demolition) in the vicinity of these materials shall comply with Cal/OSHA asbestos and lead worker construction standards. The ACBM and lead shall be disposed of properly at an appropriate offsite disposal facility. If surface staining is found on the project site, a hazardous waste specialist shall be engaged to further assess the stained area.*	LS

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		Mitigation Measure 3.8-3: *Prior to bringing hazardous materials onsite, the applicant shall submit a Hazardous Materials Business Plan (HMBP) to San Joaquin County Environmental Health Division (CUPA) for review and approval. If during the construction process the applicant or his subcontractors generates hazardous waste, the applicant must register with the CUPA as a generator of hazardous waste, obtain an EPA ID# and accumulate, ship and dispose of the hazardous waste per Health and Safety Code Ch. 6.5. (California Hazardous Waste Control Law).* ***Mitigation Measure 3.8-4****: Prior to any ground disturbance activities within 50 feet of a well on the Project site, the applicant shall hire a licensed well contractor to obtain a well destruction permit for any wells to be abandoned from the San Joaquin County Environmental Health Department, and properly abandon the on-site well(s), pursuant to review and approval by the City Engineer and the San Joaquin County Environmental Health Department.*	
Impact 3.8-2: Potential to emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.	LS		--
Impact 3.8-3: Potential to result in impacts from being included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5.	LS		--
Impact 3.8-4: Potential for the Project to result in a safety hazards for people residing or working on the project site as a result of public airport or public use airport.	LS		--

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Impact 3.8-5: Potential for the Project to result in safety hazards for people residing or working on the project site as a result of a private airstrip.	LS		--
Impact 3.8-6: Potential to impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	LS		--
Impact 3.8-7: Potential to expose people or structures to a risk of loss, injury or death from wildland fires.	LS		--
HYDROLOGY AND WATER QUALITY			
Impact 3.9-1: The proposed Project has the potential to violate water quality standards or waste discharge requirements during construction.	LS	*Implement* ***Mitigation Measure 3.6-1*****.**	--
Impact 3.9-2: The proposed Project has the potential to violate water quality standards or waste discharge requirements during operation.	PS	***Mitigation Measure 3.9-1****: The Project applicant shall implement the following nonstructural BMPs that focus on preventing pollutants from entering stormwater:* *Pollution Prevention/Good Housekeeping* ○ *A spill response and prevention plan shall be developed as a component of (1) SWPPPs prepared for construction activities, (2) SWPPPs for facilities subject to the NPDES Stormwater Permit, and (3) spill prevention control and countermeasure plans for qualifying facilities. The spill response and prevention plan shall be implemented during all construction activities.* ○ *Streets and parking lots in all non-residential portions of the Project site shall be swept at least once every two weeks.*	LS

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		Operation and Maintenance (O&M) of Treatment Controls o *An Operation and Maintenance (O&M) Plan shall be developed for the storm drainage facilities to ensure long-term performance. The O&M plan shall incorporate the manufacturers' recommended maintenance procedures and include (1) provisions for debris removal, (2) guidance for addressing public health or safety issues, and (3) methods and criteria for assessing the efficacy of the storm drainage system. An annual report shall be submitted to the City certifying that maintenance of the facilities was conducted according to the O&M plan.* ***Mitigation Measure 3.9-2**: The Project applicant shall implement the following structural BMPs that focus on preventing pollutants from entering stormwater, or alternative BMPs approved by the City of Manteca. Implementation of BMPs apply to all non-residential parcels including the right-of-way as appropriate.* *Extended Detention Facilities: Extended detention refers to the facilities proposed for the Project site that would detain and temporarily store stormwater runoff to reduce the peak rates of discharge to the storm drainage system. Detention of stormwater allows particles and other pollutants to settle and thereby potentially reduce concentrations and mass loading of contaminants in the discharge.* *Grassed Swales: A swale is a vegetated, open channel management practice designed to treat and attenuate stormwater runoff for a specified water quality volume. Stormwater runoff flowing through these channels is treated by being filtered through vegetation in the channel, through a subsoil matrix, and/or through infiltration into the underlying soils. Swales can be used throughout the proposed Project area where feasible in the landscape design to treat parking lot runoff.* *Proprietary Devices: There are a variety of commercially available stormwater treatment devices designed to remove contaminants from drainage once flows enter the conveyance systems. StormFilter™ units, or equivalent filtration-type systems, are recommended within the commercial and industrial areas as the main structural BMP for these areas. Bioswales are also recommended for streets and parking areas. Drop inlet filters should also be used to control drainage runoff water quality*	

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Impact 3.9-3: The proposed Project has the potential to substantially deplete groundwater supplies or interfere substantially with groundwater recharge.	LS		--
Impact 3.9-4: The proposed Project has the potential to alter the existing drainage pattern in a manner which would result in substantial erosion, siltation, flooding, or polluted runoff.	LS		--
Impact 3.9-5 The proposed Project has the potential to otherwise substantially degrade water quality.	LS	*Implement* ***Mitigation Measure 3.6-1*** *and* ***Mitigation Measures 3.9-1 and 3.9-2.***	--
Impact 3.9-6 Place housing or structures that would impede/redirect flows within a 100-year, or 200-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.	PS	***Mitigation Measure 3.9-3:*** *The Project site is located within the City of Manteca's F-200 zone, which makes it at risk from the 200-year flood. As such, the Project is subject to the Manteca Municipal Code Section 17.30.040 Subsection C which places construction limitations on development proposed in areas that are at risk of flooding under the 200-year storm. The Project applicant shall contribute the fair share fee to provide the urban level of flood protection for the Project site. In addition, there shall be no construction of a new residence or other structure that is located within the F-200 Zone unless the City finds, based on substantial evidence in the record, that the Project is consistent with the requirements of Manteca Municipal Code Section 17.30.040 Subsection C which is specifically in place to protect people and property from a 200-year flood.*	LS
Impact 3.9-7 The proposed Project has the potential to expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam, seiche, tsunami, or mudflow.	LS	*Implement* ***Mitigation Measure 3.9-3.***	--

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LAND USE, POPULATION, AND HOUSING			
Impact 3.10-1: The proposed Project would not physically divide an established community.	LS		--
Impact 3.10-2: The proposed Project would not conflict with an applicable land use plan, policy, or regulation of an agency with jurisdiction over the project adopted to avoid or mitigate an environmental effect.	LS		--
Impact 3.10-3: The proposed Project would not significantly conflict with an applicable habitat conservation plan or natural community conservation plan.	LS		--
Impact 3.10-4: The proposed Project has the potential to induce substantial population growth in an area.	LS		--
Impact 3.10-5: The proposed Project has the potential to displace substantial numbers of people or existing housing.	LS		--
NOISE			
Impact 3.11-1: The proposed Project has the potential to increase traffic noise levels at existing receptors.	LS		--
Impact 3.11-2: The proposed Project has the potential to increase noise levels associated with	PS	***Mitigation Measure 3.11-1:*** *Construction activities shall adhere to the requirements of the City of Manteca Municipal Code with respect to hours of operation. This requirement shall*	LS

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construction activities.		*be noted in the improvements plans prior to approval by the City's Public Works Department.* ***Mitigation Measure 3.11-2:*** *All equipment shall be fitted with factory equipped mufflers, and in good working order. This requirement shall be noted in the improvements plans prior to approval by the City's Public Works Department.*	
Impact 3.11-3: The proposed Project has the potential to increase noise vibration association with construction activities.	LS		--
Impact 3.11-4: The proposed Project has the potential to expose new sensitive receptors to excessive transportation noise.	PS	***Mitigation Measure 3.11-3:*** *Minimum 6- to 10-foot tall sound walls and/or landscaped berms shall be constructed along the primary Project-area roadways, adjacent to proposed residential uses, in order to achieve the City's exterior noise standards. See Table 3.11-10 of Section 3.11 of the Draft EIR for specific noise barrier heights along each roadway, summarized below:* • *Atherton - Residential east of McKinley to Dutch Harbor: 8-foot wall* • *Atherton - Residential east of Dutch Harbor to eastern Project boundary: 10-foot wall* • *Atherton - Residential west of McKinley: 8-foot wall* • *McKinley - Residential south of Atherton: 7-foot wall* • *Woodward - Residential west of McKinley: 6-foot wall* *Noise barrier walls shall be constructed of concrete masonry units, earthen berms, or any combination of these materials. Wood is not recommended due to eventual warping and degradation of acoustical performance. These requirements shall be included in the improvements plans prior to their approval by the City's Public Works Department.* ***Mitigation Measure 3.11-4:*** *The first row of residential uses located along SR-120 shall include windows having a Sound Transmission Class (STC) 36, or higher, rating installed in second floor facades. Exterior walls would also likely require 3-coat stucco and RC-*	LS

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ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
		channels. This would specifically apply to the first row of homes along Atherton Drive, within 800-feet of the centerline of SR-120 and does not apply to facades facing away from the roadway. A detailed analysis of any additional interior mitigation measures shall be conducted when building plans are available to verify these requirements. This requirement shall be included in the Improvement Plans for approval by the Building Department prior to the issuance of building permits for the homes in this area. ***Mitigation Measure 3.11-5:*** *Mechanical ventilation shall be installed in all residential uses to allow residents to keep doors and windows closed, as desired for acoustical isolation. This requirement shall be included in the Improvement Plans for approval by the Building Department prior to the issuance of building permits.*	
Impact 3.11-5: The proposed Project has the potential to expose sensitive receptors to substantial noise from proposed park uses.	PS	***Mitigation Measure 3.11-6:*** *Minimum 6-foot tall sound walls and/or landscaped berms shall be constructed where a park site abuts a residential use. No wall shall be required where residential uses are fronted towards a park site and separated by a roadway. Noise barrier walls shall be constructed of concrete masonry units, earthen berms, or any combination of these materials. Wood is not recommended due to eventual warping and degradation of acoustical performance. This requirement shall be included in the Improvement Plans for approval by the Building Department prior to the issuance of building permits.*	LS
Impact 3.11-6: The proposed Project has the potential to expose sensitive receptors to substantial noise from proposed commercial mixed-uses.	PS	***Mitigation Measure 3.11-7:*** *Where commercial, business professional, office, or similar uses abut residential uses or where loading docks or truck circulation routes face residential areas, the following mitigation measures shall be included in the Project design:* • *All HVAC equipment shall be located within mechanical rooms where possible or shielded from view with solid barriers;* • *Emergency generators shall comply with the City's noise criteria at the nearest noise-sensitive receivers;* • *Delivery/loading activities shall comply with the City of Manteca noise ordinance standards; and*	LS

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ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
		• *The applicant shall submit a noise study to verify that the appropriate noise control measures have been incorporated into the Project design and will achieve compliance with the City's noise level standards.* *These requirements shall be included in the Improvement Plans for approval by the Building Department and Planning Division prior to the issuance of building permits.*	
PUBLIC SERVICES AND RECREATION			
Impact 3.12-1: The proposed Project has the potential to require the construction of police department facilities which may cause substantial adverse physical environmental impacts.	LS		--
Impact 3.12-2: The proposed Project has the potential to require the construction of fire department facilities which may cause substantial adverse physical environmental impacts.	LS		--
Impact 3.12-3: The proposed Project has the potential to require the construction of school facilities which may cause substantial adverse physical environmental impacts.	LS		--
Impact 3.12-4: The proposed Project has the potential to have effects on other public facilities.	LS		--
Impact 3.12-5: The proposed Project has the potential to require the construction of park and	PS	***Mitigation Measure 3.12-1:*** *Prior to the issuance of a building permit, the developer shall verify that sufficient park area is provided for the respective projects in accordance with*	LS

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ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
recreational facilities which may cause substantial adverse physical environmental impacts.		*the Quimby Act and City Ordinances. If sufficient park area is not provided within each individual project in accordance with the Quimby Act and City Ordinances, the Project applicant shall pay applicable park in lieu fees to the City of Manteca for the value of the remaining parkland obligation. This requirement shall be included in the Improvement Plans for approval by the Building Department prior to the issuance of building permits.*	
Impact 3.12-6: The proposed Project has the potential to increase the use of existing neighborhood and regional parks or other recreational facilities, such that substantial physical deterioration of the facility would occur or be accelerated.	LS		--
TRANSPORTATION AND CIRCULATION			
Impact 3.13-1: The proposed Project would result in a significant impact at the Yosemite Avenue / McKinley Avenue intersection.	PS		SU(Short Term) LS(Long Term)
Impact 3.13-2: The proposed Project would result in a significant impact at the Atherton Drive / Airport Way intersection.	PS	***Mitigation Measure 3.13-1:*** *Prior to issuance of building permits for each phase of the Project, the Project applicant shall pay their proportionate fair share cost to signalize and restripe the Atherton Drive / Airport Way intersection. If the aforementioned improvements are specifically included in the transportation PFIP, then the Project applicant shall contribute their proportionate fair share funding by paying the transportation PFIP fee due at building permit issuance.*	SU(Short Term) LS(Long Term)
Impact 3.13-3: The proposed Project would result in a significant impact at the Woodward Avenue / Airport Way intersection.	PS	***Mitigation Measure 3.13-2:*** *Prior to issuance of building permits for each phase of the Project, the Project applicant shall pay their proportionate fair share cost to construct an eastbound left-turn lane and a southbound right-turn lane at the Woodward Avenue / Airport Way intersection. If the aforementioned improvements are specifically included in the transportation PFIP, then the Project applicant shall contribute their proportionate fair*	SU(Short Term) LS(Long Term)

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ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
		share funding by paying the transportation PFIP fee due at building permit issuance.	
Impact 3.13-4: The proposed Project would result in increased delay at the Eastbound SR 120 Ramps / Airport Way intersection.	PS	***Mitigation Measure 3.13-3:*** *Prior to the issuance of final occupancy of the first unit past 33% of total units, the Project applicant shall coordinate with the City to ensure that appropriate signal timing adjustments are made to the Eastbound SR 120 Ramps / Airport Way intersection once traffic volumes warrant such.*	SU(Short Term) LS(Long Term)
Impact 3.13-5: The proposed Project would result in a significant impact at the Atherton Drive / Dutch Harbor Way / Commercial Driveway intersection.	PS	***Mitigation Measure 3.13-4:*** *Prior to issuance of building permits for each phase of the Project, the Project applicant shall pay for and construct the following improvements at the Atherton Drive / Dutch Harbor Way / Commercial Driveway intersection:* • *Signalize the intersection;* • *Construct an eastbound left-turn lane; and* • *Construct a southbound left-turn lane in addition to a shared through/right lane.*	LS
Impact 3.13-6: The proposed Project would result in a significant impact to freeway facilities.	PS	***Mitigation Measure 3.13-5:*** *Prior to issuance of building permits for each phase of the Project, the Project applicant shall contribute the appropriate San Joaquin Regional Traffic Impact Fee (RTIF) to cover their proportionate cost of the improvements to the affected freeway facilities in order to satisfy their fair share obligation.*	SU(Short Term) LS(Long Term)
Impact 3.13-7: The proposed Project would adversely affect pedestrian and bicycle facilities.	PS	***Mitigation Measure 3.13-6:*** *The Project applicant shall provide a Class I Bike Path along Atherton Drive through the Project site and along McKinley Avenue north of Atherton Drive in order to be consistent with the City of Manteca Bicycle Master Plan. The improvements shall be reflected on the Improvement Plans for the Project.*	LS
Impact 3.13-8: The proposed Project would significantly impact transit services or facilities.	PS	***Mitigation Measure 3.13-7:*** *Prior to approval of improvement plans for each phase of the Project, the Project applicant shall work with Manteca Transit in enhancing future service to serve the Project, consistent with the Project's Transit Plan, as well as the Manteca Transit Short Range Transit Plan (2014), the SCJOG RTP/SCS, and the City of Manteca General Plan. Methods to enhance future service to the Project may include the installation of bus turnouts or bus stops. Any potential agreements to enhance future service to the Project site shall be reflected on the Project improvement plans.*	LS

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ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
Impact 3.13-9: The proposed Project may impact at-grade rail crossings.	LS		--
Impact 3.13-10: Under Cumulative conditions, the proposed Project would impact the Yosemite Avenue / McKinley Avenue intersection.	LS		--
Impact 3.13-11: Under Cumulative conditions, the proposed Project would impact the McKinley Avenue / Woodward Avenue intersection.	PS	***Mitigation Measure 3.13-8:*** *Prior to issuance of building permits for each phase of the Project, the Project applicant shall pay their proportionate fair share cost to construct a roundabout and left-turn pockets at the McKinley Avenue / Woodward Avenue intersection. If the aforementioned improvements are specifically included in the transportation PFIP, then the Project applicant shall contribute their proportionate fair share funding by paying the transportation PFIP fee due at building permit issuance.*	SU(Short Term) LS(Long Term)
Impact 3.13-12: Under Cumulative conditions, the proposed Project would result in a significant impact at the Daniels Street / Airport Way intersection.	PS	***Mitigation Measure 3.13-9:*** *Prior to issuance of building permits for each phase of the Project, the Project applicant shall pay their proportionate fair share cost to restripe and construct a third southbound through lane at the Daniels Street / Airport Way intersection. If the aforementioned improvements are specifically included in the transportation PFIP, then the Project applicant shall contribute their proportionate fair share funding by paying the transportation PFIP fee due at building permit issuance.*	SU(Short Term) LS(Long Term)
Impact 3.13-13: Under Cumulative conditions, Project implementation would exacerbate unacceptable levels of service at the SR 120 / Airport Way interchange.	PS	***Mitigation Measure 3.13-10:*** *Prior to issuance of building permits for each phase of the Project, the Project applicant shall contribute the appropriate San Joaquin Regional Traffic Impact Fee (RTIF) to cover their proportionate cost of the improvements to the SR 120 / Airport Way interchange in order to satisfy their fair share obligation.*	SU(Short Term) LS(Long Term)
Impact 3.13-14: Under Cumulative conditions, the proposed Project would result in a significant impact at the Atherton Drive / Airport Way intersection.	PS	*Implement* ***Mitigation Measure 3.13-1.***	SU(Short Term) LS(Long Term)

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ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
Impact 3.13-15: Under Cumulative conditions, the proposed Project would result in a significant impact at the Airport Way / Woodward Avenue intersection.	PS	*Implement **Mitigation Measure 3.13-2.***	SU(Short Term) LS(Long Term)
Impact 3.13-16: Under Cumulative conditions, Project implementation would exacerbate cumulatively unacceptable LOS at the SR 120 / Union Road interchange.	PS	***Mitigation Measure 3.13-11:** Prior to issuance of building permits for each phase of the Project, the Project applicant(s) shall contribute the appropriate San Joaquin Regional Traffic Impact Fee (RTIF) to cover their proportionate cost of the improvements at the SR 120 / Union Road interchange.*	SU(Short Term) LS(Long Term)
Impact 3.13-17: Under Cumulative conditions the proposed Project would result in an impact at the McKinley Avenue / Atherton Drive intersection.	PS	***Mitigation Measure 3.13-12:** Prior to issuance of building permits for each phase of the Project, the Project applicant shall pay their proportionate fair share cost to optimize the signal timings at the McKinley Avenue / Atherton Drive intersection. If the aforementioned improvement is specifically included in the transportation PFIP, then the Project applicant shall contribute their proportionate fair share funding by paying the transportation PFIP fee due at building permit issuance.*	SU(Short Term) LS(Long Term)
Impact 3.13-18: Under Cumulative conditions, the proposed Project would result in a significant impact at the Atherton Drive / Multi-Family Driveway intersection.	PS	***Mitigation Measure 3.13-13:** Prior to issuance of building permits for each phase of the Project, the Project applicant shall pay for and construct the following improvement at the Atherton Drive / Multi-Family Driveway intersection:* • *Signalize the intersection.*	LS
Impact 3.13-19: Under Cumulative conditions, the proposed Project would result in a significant impact at the Atherton Drive / Commercial Driveway intersection.	PS	*Implement **Mitigation Measure 3.13-4.***	LS
Impact 3.13-20: Under Cumulative conditions, the proposed Project would result in an impact at the McKinley Avenue / Denali Drive		***Mitigation Measure 3.13-14:** Prior to issuance of building permits for each phase of the Project, the Project applicant shall pay their proportionate fair share cost to signalize and construct a second northbound through lane at the McKinley Avenue / Denali Drive intersection. If the aforementioned improvements are specifically included in the*	SU(Short Term)

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ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
intersection.		*transportation PFIP, then the Project applicant shall contribute their proportionate fair share funding by paying the transportation PFIP fee due at building permit issuance.*	LS(Long Term)
Impact 3.13-21: Under Cumulative conditions, the proposed Project would result in an impact at the SR 120 / McKinley Avenue interchange.		*Implement* ***Mitigation Measure 3.13-5.***	SU(Short Term) LS(Long Term)
Impact 3.13-22: Under Cumulative conditions, the proposed Project would result in a significant impact to freeway facilities.		*Implement* ***Mitigation Measure 3.13-5.***	SU(Short Term) LS(Long Term)
Impact 3.13-23: Under Cumulative conditions, the proposed Project would adversely affect pedestrian and bicycle facilities.	PS	*Implement* ***Mitigation Measure 3.13-6.***	LS
Impact 3.13-24: Under Cumulative conditions, the proposed Project would adversely affect transit services or facilities.	PS	*Implement* ***Mitigation Measure 3.13-7.***	LS
Impact 3.13-25: Under Cumulative conditions, the proposed Project could cause potentially significant impacts to at-grade rail crossings.	LS		--

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ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
UTILITIES			
Impact 3.14-1: The proposed Project has the potential to exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board.	LS		--
Impact 3.14-2: The proposed Project has the potential to result in a determination by the wastewater treatment and/or collection provider which serves or may serve the project that is does not have adequate capacity to serve the project's projected demand in addition to the provider's existing commitments.	PS	***Mitigation Measure 3.14-1:*** *Prior to occupancy of any building that would require wastewater treatment services, the Project proponent shall secure adequate wastewater treatment capacity/allocation.*	LS
Impact 3.14-3: The proposed Project has the potential to require or result in the construction of new wastewater treatment or collection facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.	LS		--
Impact 3.14-4: The proposed Project has the potential to require construction of new water treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.	LS		--
Impact 3.14-5: The proposed Project has the potential to have insufficient water supplies available to serve the project from existing entitlements and resources.	LS		--

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ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
Impact 3.14-6: The proposed Project has the potential to require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.	PS	*Implement* ***Mitigation Measure 3.9-3.*** ***Mitigation Measure 3.14-2:*** *Prior to the issuance of a building or grading permit, the Project applicant shall submit a drainage plan to the City of Manteca for review and approval. The plan shall include an engineered storm drainage plan that demonstrates attainment of pre-Project runoff requirements and describes the volume reduction measures and treatment controls used to reach attainment consistent with the Manteca Storm Drain Master Plan.* ***Mitigation Measure 3.14-3:*** *Prior to the issuance of a building or grading permit, the Project applicant shall prepare a storm drainage plan in accordance with the City of Manteca Storm Drain Master Plan effective at the time of approval. The Project applicant shall cooperate with the City to resolve the current Zone 39 discharge solution, but may utilize an interim drainage plan in accordance with the currently approved Storm Drain Master Plan if the Zone 39 discharge solution is not finalized when the project drainage plan is submitted for approval. At the direction of the City of Manteca, once the solution has been identified, the Project applicant shall fund their fair share of the solution's development and implementation. If the Zone 39 storm discharge solution improvements have been incorporated into the PFIP, then the Project applicant shall pay their fair share by paying the amended Zone 39 Storm Drain PFIP fee.*	LS
Impact 3.14-7: The proposed Project has the potential to be served by a landfill with sufficient permitted capacity to accommodate the Project's solid waste disposal needs and comply with federal, State, and local statutes and regulations related to solid waste.	PS	***Mitigation Measure 3.14-4:*** *Prior to the issuance of a building or grading permit, the project applicant shall be subject to contribute the project's fair share payment towards the City's waste connection fee program.*	LS
CUMULATIVE IMPACTS			
Impact 4.1: Cumulative Damage to Scenic Resources within a State Scenic Highway	LS and LCC		--

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ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
Impact 4.2: Cumulative Degradation of the Existing Visual Character of the Region	PS		CC and SU
Impact 4.3: Cumulative Impact on Light and Glare	LS and LCC		--
Impact 4.4: Cumulative Impact on Agricultural Resources	PS		CC and SU
Impact 4.5: Cumulative Impact on the Region's Air Quality	PS		CC and SU
Impact 4.6: Cumulative Loss of Biological Resources Including Habitats and Special Status Species	LS and LCC		--
Impact 4.7: Cumulative Impacts on Known and Undiscovered Cultural or Tribal Resources	LS and LCC		--
Impact 4.8: Cumulative Impact on Geologic Resources, Soil Resources, and Mineral Resources	LS and LCC		--
Impact 4.9: Cumulative Impact on Climate Change from Increased Project-Related Greenhouse Gas Emissions	LS and LCC		--
Impact 4.10: Cumulative Impact Related to Hazards and Hazardous Materials	LS and LCC		--

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ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
Impact 4.11: Cumulative Increases in Peak Stormwater Runoff from the Project site	LS and LCC		--
Impact 4.12: Cumulative Impacts Related to Degradation of Water Quality	LS and LCC		--
Impact 4.13: Cumulative Impacts Related to Degradation of Groundwater Supply or Recharge	LS and LCC		--
Impact 4.14: Cumulative Impacts Related to Flooding	LS and LCC		--
Impact 4.15: Cumulative Impact on Communities and Local Land Uses	LS and LCC		--
Impact 4.16: Cumulative Impacts on Population and Housing	LS and LCC		--
Impact 4.17: Cumulative Exposure of Existing and Future Noise-Sensitive Land Uses to Increased Noise Resulting from Cumulative Development	LS and LCC		--
Impact 4.18: Cumulative Impact on Public Services	LS and LCC		--
Impact 4.19: Under Cumulative conditions, the proposed Project would impact the Yosemite Avenue / McKinley Avenue intersection.	LS and LCC		--

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ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
Impact 4.20: Under Cumulative conditions, the proposed Project would impact the McKinley Avenue / Woodward Avenue intersection.	PS	*Implement* ***Mitigation Measure 3.13-8.***	CC and SU (Short Term) LCC and LS (Long Term)
Impact 4.21: Under Cumulative conditions, the proposed Project would result in a significant impact at the Daniels Street / Airport Way intersection.	PS	*Implement* ***Mitigation Measure 3.13-9.***	CC and SU (Short Term) LCC and LS (Long Term)
Impact 4.22: Under Cumulative conditions, Project implementation would exacerbate unacceptable levels of service at the SR 120 / Airport Way interchange.	PS	*Implement* ***Mitigation Measure 3.13-9.***	CC and SU (Short Term) LCC and LS (Long Term)
Impact 4.23: Under Cumulative conditions, the proposed Project would result in a significant impact at the Atherton Drive / Airport Way intersection.	PS	*Implement* ***Mitigation Measure 3.13-1.***	CC and SU (Short Term) LCC and LS (Long Term)
Impact 4.24: Under Cumulative conditions, the proposed Project would result in a significant impact at the Airport Way / Woodward Avenue intersection.	PS	*Implement* ***Mitigation Measure 3.13-2.***	CC and SU (Short Term) LCC and LS (Long Term)

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ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
Impact 4.25: Under Cumulative conditions, Project implementation would exacerbate cumulatively unacceptable LOS at the SR 120 / Union Road interchange.	PS	*Implement* ***Mitigation Measure 3.13-11.***	CC and SU (Short Term) LCC and LS (Long Term)
Impact 4.26: Under Cumulative conditions, the proposed Project would result in an impact at the McKinley Avenue / Atherton Drive intersection.	PS	*Implement* ***Mitigation Measure 3.13-12.***	CC and SU (Short Term) LCC and LS (Long Term)
Impact 4.27: Under Cumulative conditions, the proposed Project would result in a significant impact at the Atherton Drive / Multi-Family Driveway intersection.	PS	*Implement* ***Mitigation Measure 3.13-13.***	LCC and LS
Impact 4.28: Under Cumulative conditions, the proposed Project would result in a significant impact at the Atherton Drive / Commercial Driveway intersection.	PS	*Implement* ***Mitigation Measure 3.13-4.***	LCC and LS
Impact 4.29: Under Cumulative conditions, the proposed Project would result in an impact at the McKinley Avenue / Denali Drive intersection.	PS	*Implement* ***Mitigation Measure 3.13-14.***	CC and SU (Short Term) LCC and LS (Long Term)
Impact 4.30: Under Cumulative conditions, the proposed Project would result in an impact at the SR 120 / McKinley Avenue interchange.	PS	*Implement* ***Mitigation Measure 3.13-5.***	CC and SU (Short Term) LCC and LS (Long Term)

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LS – less than significant
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ENVIRONMENTAL IMPACT	*LEVEL OF SIGNIFICANCE WITHOUT MITIGATION*	*MITIGATION MEASURE*	*RESULTING LEVEL OF SIGNIFICANCE*
Impact 4.31: Under Cumulative conditions, the proposed Project would result in a significant impact to freeway facilities.	PS	*Implement* ***Mitigation Measure 3.13-5.***	CC and SU
Impact 4.32: Under Cumulative conditions, the proposed Project would adversely affect pedestrian and bicycle facilities.	PS	*Implement* ***Mitigation Measure 3.13-6.***	LCC and LS
Impact 4.33: Under Cumulative conditions, the proposed Project would adversely affect transit services or facilities.	PS	*Implement* ***Mitigation Measure 3.13-7.***	LCC and LS
Impact 4.34: Under Cumulative conditions, the proposed Project could cause potentially significant impacts to at-grade rail crossings.	LS and LCC		--
Impact 4.35: Cumulative Impact on Wastewater Utilities	LS and LCC		--
Impact 4.36: Cumulative Impact on Water Utilities	LS and LCC		--
Impact 4.37: Cumulative Impact on Stormwater Facilities	LS and LCC		--
Impact 4.38: Cumulative Impact on Solid Waste Facilities	LS and LCC		--

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1.1 PURPOSE AND INTENDED USES OF THE EIR

The City of Manteca, as the lead agency, determined that the proposed Oakwood Landing – Cerri & Denali Subdivisions Project is a "project" within the definition of CEQA. CEQA requires the preparation of an environmental impact report (EIR) prior to approving any project, which may have a significant impact on the environment. For the purposes of CEQA, the term "project" refers to the whole of an action, which has the potential for resulting in a direct physical change or a reasonably foreseeable indirect physical change in the environment (CEQA Guidelines Section 15378[a]).

An EIR must disclose the expected environmental impacts, including impacts that cannot be avoided, growth-inducing effects, impacts found not to be significant, and significant cumulative impacts, as well as identify mitigation measures and alternatives to the proposed project that could reduce or avoid its adverse environmental impacts. CEQA requires government agencies to consider and, where feasible, minimize environmental impacts of proposed development, and an obligation to balance a variety of public objectives, including economic, environmental, and social factors.

The City of Manteca, as the lead agency, has prepared this Draft EIR to provide the public and responsible and trustee agencies with an objective analysis of the potential environmental impacts resulting from implementation of the proposed Project. The environmental review process enables interested parties to evaluate the proposed Project in terms of its environmental consequences, to examine and recommend methods to eliminate or reduce potential adverse impacts, and to consider a reasonable range of alternatives to the proposed Project. This EIR will be used by the City of Manteca to determine whether to approve, modify, or deny the proposed Project and associated approvals in light of the Project's environmental effects. The EIR will be used as the primary environmental document to evaluate full development, all associated infrastructure improvements, and permitting actions associated with the proposed Project. All of the actions and components of the proposed Project are described in detail in Chapter 2.0, Project Description.

1.2 TYPE OF EIR

The State CEQA Guidelines identify several types of EIRs, each applicable to different project circumstances. This EIR has been prepared as a Project-level EIR is described in State CEQA Guidelines § 15161 as: "The most common type of EIR (which) examines the environmental impacts of a specific development project. This type of EIR should focus primarily on the changes in the environment that would result from the development project. The EIR shall examine all phases of the project including planning, construction, and operation. The project-level analysis considers the broad environmental effects of the proposed Project.

1.3 KNOWN RESPONSIBLE AND TRUSTEE AGENCIES

The term "Responsible Agency" includes all public agencies other than the Lead Agency that have discretionary approval power over the proposed Project or an aspect of the proposed Project

(CEQA Guidelines Section 15381). For the purpose of CEQA, a "Trustee" agency has jurisdiction by law over natural resources that are held in trust for the people of the State of California (CEQA Guidelines Section 15386). The following agencies are considered "Responsible Agencies" or "Trustee Agencies" for the proposed Project, and may be required to issue permits or approve certain aspects of the proposed Project:

- Central Valley Regional Water Quality Control Board (CVRWQCB) - Storm Water Pollution Prevention Plan (SWPPP) approval prior to construction activities pursuant to the Clean Water Act;
- San Joaquin Valley Air Pollution Control District (SJVAPCD) - Approval of construction-related air quality permits;
- San Joaquin Valley Air Pollution Control District (SJVAPCD) - Authority to Construct, Permit to Operate for stationary sources of air pollution; and
- SJCOG, Inc. (SJCOG) - Issuance of incidental take permit under the San Joaquin Multi-Species Habitat Conservation and Open Space Plan (SJMSCP).

1.4 ENVIRONMENTAL REVIEW PROCESS

The review and certification process for the EIR has involved, or will involve, the following general procedural steps:

NOTICE OF PREPARATION

The City of Manteca circulated a Notice of Preparation (NOP) of an EIR for the proposed Project on August 18, 2016 to State Clearinghouse, State Responsible Agencies, State Trustee Agencies, Other Public Agencies, Organizations and Interested Persons. A public scoping meeting was held on September 19, 2016 to present the project description to the public and interested agencies, and to receive comments from the public and interested agencies regarding the scope of the environmental analysis to be included in the Draft EIR. Concerns raised in response to the NOP were considered during preparation of the Draft EIR. The NOP and comments received on the NOP by interested parties are presented in Appendix A.

DRAFT EIR

This document constitutes the Draft EIR. The Draft EIR contains a description of the proposed Project, description of the environmental setting, identification of project impacts, and mitigation measures for impacts found to be significant, as well as an analysis of project alternatives, identification of significant irreversible environmental changes, growth-inducing impacts, and cumulative impacts. This Draft EIR identifies issues determined to have no impact or a less than significant impact, and provides detailed analysis of potentially significant and significant impacts. Comments received in response to the NOP were considered in preparing the analysis in this EIR. Upon completion of the Draft EIR, the City of Manteca will file the Notice of Completion (NOC) with the State Clearinghouse of the Governor's Office of Planning and Research to begin the public review period. Additionally, the City of Manteca will file the Notice of Availability with the County

Clerk and have it published in a newspaper of regional circulation to begin the local public review period.

PUBLIC NOTICE/PUBLIC REVIEW

The City of Manteca will provide a public notice of availability for the Draft EIR, and invite comment from the general public, agencies, organizations, and other interested parties. Consistent with CEQA, the review period for this Draft EIR is forty-five (45) days. Public comment on the Draft EIR will be accepted in written form. All comments or questions regarding the Draft EIR should be addressed to:

Attn: Rochelle Henson, Senior Planner
Manteca Community Development Department, Planning Division
1001 West Center Street
Manteca, CA 95337
(209) 456-8522

RESPONSE TO COMMENTS/FINAL EIR

Following the public review period, a Final EIR will be prepared. The Final EIR will respond to written comments received during the public review period and to oral comments received at a public hearing during such review period.

CERTIFICATION OF THE EIR/PROJECT CONSIDERATION

The City of Manteca will review and consider the Final EIR. If the City of Manteca finds that the Final EIR is "adequate and complete", the City of Manteca will certify the Final EIR in accordance with CEQA. The rule of adequacy generally holds that an EIR can be certified if:

1) The EIR shows a good faith effort at full disclosure of environmental information; and

2) The EIR provides sufficient analysis to allow decisions to be made regarding the proposed project in contemplation of environmental considerations.

Following review and consideration of the Final EIR, the City of Manteca may take action to approve, modify, or reject the proposed Project. A Mitigation Monitoring Program, as described below, would also be adopted in accordance with Public Resources Code Section 21081.6(a) and CEQA Guidelines Section 15097 for mitigation measures that have been incorporated into or imposed upon the proposed Project to reduce or avoid significant effects on the environment. This Mitigation Monitoring Program will be designed to ensure that these measures are carried out during project implementation, in a manner that is consistent with the EIR.

1.5 ORGANIZATION AND SCOPE

Sections 15122 through 15132 of the State CEQA Guidelines identify the content requirements for Draft and Final EIRs. An EIR must include a description of the environmental setting, an environmental impact analysis, mitigation measures, alternatives, significant irreversible

environmental changes, growth-inducing impacts, and cumulative impacts. Discussion of the environmental issues addressed in the Draft EIR was established through review of environmental and planning documentation developed for the proposed Project, environmental and planning documentation prepared for recent projects located within the City of Manteca, applicable local and regional planning documents, and responses to the Notice of Preparation (NOP).

This Draft EIR is organized in the following manner:

EXECUTIVE SUMMARY

This Executive Summary summarizes the characteristics of the proposed project, known areas of controversy and issues to be resolved, and provides a concise summary matrix of the proposed Project's environmental impacts and possible mitigation measures. This chapter identifies alternatives that reduce or avoid at least one significant environmental effect of the proposed Project.

CHAPTER 1.0 – INTRODUCTION

Chapter 1.0 briefly describes the purpose of the environmental evaluation, identifies the lead, trustee, and responsible agencies, summarizes the process associated with preparation and certification of an EIR, and identifies the scope and organization of the Draft EIR.

CHAPTER 2.0 – PROJECT DESCRIPTION

Chapter 2.0 provides a detailed description of the proposed Project, including the location, intended objectives, background information, the physical and technical characteristics, including the decisions subject to CEQA, related improvements, and a list of related agency action requirements.

CHAPTER 3.0 – ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

Chapter 3.0 contains an analysis of environmental topic areas as identified below. Each subchapter addressing a topical area is organized as follows:

Environmental Setting. A description of the existing environment as it pertains to the topical area.

Regulatory Setting. A description of the regulatory environment that may be applicable to the proposed Project.

Impacts and Mitigation Measures. Identification of the thresholds of significance by which impacts are determined, a description of project-related impacts associated with the environmental topic, identification of appropriate mitigation measures, and a conclusion as to the significance of each impact.

The following environmental topics are addressed in this section:

- Aesthetics and Visual Resources

- Agricultural Resources
- Air Quality
- Biological Resources
- Cultural and Tribal Resources
- Geology, Soils, and Mineral Resources
- Greenhouse Gases and Climate Change
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use, Population, and Housing
- Noise
- Public Services and Recreation
- Transportation and Circulation
- Utilities

CHAPTER 4.0 – OTHER CEQA-REQUIRED TOPICS

Chapter 4.0 evaluates and describes the following CEQA required topics: impacts considered less-than-significant, significant and irreversible impacts, growth-inducing effects, cumulative, and significant and unavoidable environmental effects.

CHAPTER 5.0 – ALTERNATIVES TO THE PROJECT

State CEQA Guidelines Section 15126.6 requires that an EIR describe a range of reasonable alternatives to the proposed Project, which could feasibly attain the basic objectives of the proposed Project and avoid and/or lessen any significant environmental effects of the proposed Project. Chapter 5.0 provides a comparative analysis between the environmental impacts of the proposed Project and the selected alternatives.

CHAPTER 6.0 – REPORT PREPARERS

This section lists all authors and agencies that assisted in the preparation of the EIR, by name, title, and company or agency affiliation.

APPENDICES

This section includes all notices and other procedural documents pertinent to the EIR, as well as technical material prepared to support the analysis.

1.6 COMMENTS RECEIVED ON THE NOTICE OF PREPARATION

The City of Manteca received seven written comment letters and two electronic comment letters on the NOP for the proposed Project. A copy of the letters is provided in Appendix A of this Draft EIR. The commenting agency/citizen is provided below. The City also held a public scoping meeting on September 14, 2016. No written or verbal comments were provided at that scoping meeting.

- California Department of Transportation, District 10;
- California Water Boards, Central Valley Regional Water Quality Control Board;

- City of Lathrop;
- Department of California Highway Patrol, Stockton Area;
- Manteca Unified School District;
- Native American Heritage Commission;
- RLC Associates;
- San Joaquin County Environmental Health Department; and
- Terra Land Group, LLC.

2.1 PROJECT LOCATION

The Project site is located in the southwestern portion of the City of Manteca city limits. The Project site is immediately southeast of the intersection of Bronzan Road and McKinley Avenue. The Project site is bounded on the north by an existing dirt roadway between Bronzan Road and Atherton Drive, on the east by South McKinley Avenue and an existing residential subdivision, on the south by existing agricultural fields, and on the west by existing agricultural fields and the future Atherton Drive right-of-way. The Project site is located within Sections 11 and 12 of Township 2 South, Range 6 East MDBM. The Project site is shown on the Manteca, California, 7.5-minute series quadrangle map. Figures 2.0-1 and 2.0-2 show the Project's regional location and vicinity.

2.2 PROJECT SETTING

EXISTING SITE CONDITIONS

The Project site is made up of four assessor parcels (APNs), which are listed in Table 2.0-1, and are displayed on Figure 2.0-3. The total Project site acreage, 258.29 acres, includes four assessor parcels (255.11 acres) and portions of the Woodward Avenue and McKinley Avenue right-of-way (3.18 acres).

TABLE 2.0-1: PARCELS WITHIN THE PROJECT SITE

APN / RIGHT OF WAY	*ACREAGE*
241-26-012	11.59
241-32-020	81.04
241-26-004	79.39
241-32-061	83.09
Public Right-of-Way	3.18
Total	**258.29**

SITE TOPOGRAPHY

The Project site is relatively flat with natural gentle slope from north to south. The Project site topography ranges in elevation from approximately 20 to 30 feet above sea level. Figure 2.0-4 shows the U.S. Geological Survey (USGS) Topographic Map of the Project site.

EXISTING SITE USES

The Project site has some existing improvements including an existing barn area with associated equipment, dirt and paved roadways, and irrigation ditches. The majority of the Project site is in active agricultural use. The barn structure is located in the central portion of the Project site. Additionally, Woodward Avenue traverses the center of the Project site from east to west, and McKinley Avenue traverses the northern portion of the Project site from north to south. Figure 2.0-5 shows aerial imagery of the existing site uses within the Project site.

EXISTING SURROUNDING USES

Uses immediately adjacent to the east, south, and west of the Project site include agricultural and residential uses, including ranchettes and large estates lots. Other existing uses east of the northerly portion of the Project site include a single family residential subdivision west of South Airport Way. Existing and future residential subdivisions also exist to the west of the Project site. Other nearby uses includes rural residential uses north of the Project site and south of State Route (SR) 120.

EXISTING CITY OF MANTECA GENERAL PLAN LAND USE DESIGNATIONS

The Project site is currently located within the City of Manteca. The Manteca General Plan 2023 designates the Project site as Urban Reserve Business Industrial Park (UR-BIP, Floor Area Ratio [FAR] 1.0), Urban Reserve Very Low Density Residential (UR-VLDR, less than 2.0 dwelling units per acre [du/ac]), Business Industrial Park (BIP, FAR 1.0), Commercial Mixed Use (CMU, 15.1 to 25 du/ac), General Commercial (GC, FAR 0.6), and Open Space (OS).

Figure 2.0-6 depicts the Manteca General Plan 2023 land use designations for the Project site and the surrounding areas. The General Plan contains the following standards to guide development for these land uses:

UR-BIP (Urban Reserve Business Industrial Park): Urban Reserve is applied to many properties around the perimeter of the City. In most instances, the Urban Reserve category overlies another land use category.

UR-VLDR (Urban Reserve Very Low Density Residential): Urban Reserve is applied to many properties around the perimeter of the City. In most instances, the Urban Reserve category overlies another land use category.

BIP (Business Industrial Park): The BIP designation is intended to provide sites for large uses in an office park environment that would include multi-tenant buildings. Business parks of this nature are well suited for research and development facilities and also provide an attractive business environment for unrelated businesses. Typical uses permitted within the Business Industrial Park land use include: administrative and general office, corporate or regional headquarters, research and development facilities, medical offices, professional services such as attorneys, accountants and insurance, and light industrial, including manufacturing and assembly.

CMU (Commercial Mixed Use): The CMU designation will accommodate a variety of purposes including high density residential, employment centers, retail commercial, and professional offices.

GC (General Commercial): The GC designation provides for wholesale, warehousing, and heavy commercial uses, highway oriented commercial retail, public and quasi-public uses, and similar and compatible uses. The designation is also intended to accommodate visitor commercial, lodging, commercial recreation and public gathering facilities, such as amphitheaters, or public gardens.

OS (Open Space): The OS designation encompasses habitat, open space, natural areas, lands of special status species, wetlands and riparian areas. These areas are set aside as permanent open space preserves to protect environmentally sensitive areas.

EXISTING CITY OF MANTECA ZONING DESIGNATIONS

The Manteca Zoning Ordinance designates the Project site for Business Industrial Park (BIP), General Commercial (CG), Commercial Mixed Use (CMU), Open Space (OS), and Undesignated (UND) uses. Below is a general description of City zoning within the Project site. The City zoning designations for the Project site and surrounding area are shown on Figure 2.0-7.

BIP Zone (Business Industrial Park): This designation creates large sites for office park environment that includes multi-tenant buildings. The BIP Zone will be well suited for research and development facilities and light industrial uses, as well as professional and medical offices. Warehouses will be permitted but limited in size. Specifically, this zone allows for research and development, small-scale manufacturing, business support service, and utility, transportation, communication, and public facility uses. The maximum FAR in the BIP Zone is 1.0 and the maximum building height is 35 feet.

CG Zone (General Commercial): This category provides for wholesale, warehousing, and heavy commercial uses, highway-oriented commercial retail, public and quasi-public uses, and similar and compatible uses. The CG Zone is also intended to accommodate visitor lodging, commercial recreation and public gathering facilities, such as amphitheaters, or public gardens. It also allows most neighborhood and mixed commercial uses. Specifically, this zone allows for animal-related uses, recreation and public assembly uses, retail/service uses, and utility, transportation, communication, and public facility uses. The maximum FAR in the CG Zone is 0.6.

CMU Zone (Commercial Mixed Use): This designation will accommodate a variety of uses including high-density residential, employment centers, retail commercial, and professional offices. Specifically, this zone allows for some residential uses, animal-related uses, recreation and public assembly uses, public transportation facility uses, and retail, service, and office uses. The allowed density in the CMU Zone is 15.1 to 25.0 du/ac and the maximum FAR is 1.0 and the maximum building height is 35 feet.

OS Zone (Open Space): This designation is set aside for habitat, open space, natural areas, lands of special-status species, wetlands, and riparian areas. These areas are set aside as permanent open space preserves to protect environmentally sensitive areas. This zone allows for community garden uses, outdoor commercial or community recreation uses, and resource protection and restoration uses.

UND Zone (Undesignated): The City's Zoning Ordinance does not contain allowed uses or development standards for the UND Zone.

SURROUNDING GENERAL PLAN DESIGNATIONS

Lands to the north of the Project site are designated GC, BIP, and Low Density Residential (LDR). Lands to the east of the Project site are designated LDR, Park (P), GC, and High Density Residential (HDR). Lands to the south of the Project site are designated OS, UR-VLDR, Agriculture (AG), and LDR. Lands to the west of the Project site are designated GC, LDR, and OS. The City of Manteca General Plan land use designations for the Project site and surrounding areas are shown on Figure 2.0-6.

2.3 PROJECT GOALS AND OBJECTIVES

Consistent with Section 15124(b) of the California Environmental Quality Act (CEQA) Guidelines, a clear statement of objectives and the underlying purpose of the proposed Project shall be discussed. The principal objective of the proposed Project is the approval and subsequent implementation of the Oakwood Landing – Cerri & Denali Subdivisions Project (the proposed Project). The quantifiable objectives of the proposed Project include development of the 258.29-acre Project site, which will include: Low Density Residential, High Density Residential, General Commercial, and Open Space.

The Oakwood Landing – Cerri & Denali Subdivisions Project identifies the following objectives:

- Establish a mixed use project with residential, commercial, and public facilities that collectively provide for local and regional housing and employment opportunities and that take advantage of the area's high level of accessibility.
- Low Density Residential: Provide residential housing opportunities that are visually attractive and accommodate the future housing demand in Manteca.
- General Commercial: Establish a core of regional and local serving business and commercial uses that capitalize upon the visibility and access provided by SR 120.
- Public Facilities: Provide infrastructure, park space, and open space that meets City standards, is integrated with existing and planned facilities and connections, and increases recreation opportunities for existing and future residents of the City.
- Phasing: Establishes a logical phasing plan designed to ensure that each phase of development would include necessary public improvements required to meet City standards.

2.4 PROJECT CHARACTERISTICS AND DESCRIPTION

PROJECT CHARACTERISTICS

The proposed Project is primarily a residential development anticipated to provide up to 1,265 units. Additionally, the proposed Project includes 13.0 acres of general commercial uses anticipated to provide up to approximately 237,838 square feet of commercial. The Project would provide approximately 16.06 acres of parkland and would maintain approximately 6.77 acres of open space.

The Oakwood Landing Site Plan is shown on Figure 2.0-8a. However, as the plan area is developed in phases over time, the location of these lot size and types may be moved around based on demand and market conditions.

Other land uses to support and compliment the proposed residential community include:

- Park and open space - parks, landscaping, non-vehicular circulation, storm water filtration and retention/dual use park areas; and
- Roadway circulation - arterial and collector streets with bicycle and pedestrian circulation.

As shown in Table 2.0-2, the proposed Project would include development of up to 290 HDR units, 975 LDR units, and 237,838 square feet of GC uses.

TABLE 2.0-2: LAND USE SUMMARY

PROPOSED LAND USE DESIGNATIONS	*APPROXIMATE ACRES*	*ALLOWABLE DENSITY (OR FAR)*	*PROPOSED AVERAGE DENSITY (OR FAR)*	*PROJECTED NUMBER OF UNITS (OR SQUARE FEET)*
HDR	11.59	15.1 to 25.0	25.0	290 units
LDR	226.93	2.1 to 8.0	4.3	975 units
GC	13.00	0.6	0.43	237,838 SF
OS	6.77	--	--	--
Total	**258.29**	**--**	**--**	**1,265 units / 237,838 SF**

Development of the proposed Project will depend on market conditions and demand. The plan for infrastructure allows for development to occur in phases to respond to the market conditions and demand.

RESIDENTIAL DEVELOPMENT AREAS

The proposed Project will provide a variety of housing types and lot sizes that will accommodate a range of housing objectives and buyer needs with a goal to ensure housing for a variety of families and lifestyles. As shown in Table 2.0-2 above, at full build-out, the Project site will accommodate up to 1,265 residential units.

The residential areas are divided into two tentative subdivision maps. One subdivision map, the Denali Subdivision, would subdivide the northern 83.09-acres of the Project site into 319 single family residential lots. Lot sizes within the Denali Subdivision would range from 5,000 square feet to 16,300 square feet. A 6.06-acre park/basin area would be located in the central portion of the Denali Subdivision. Additionally, a 1.0-acre upland play area would be located adjacent to the park/basin. See Figure 2.0-8b for the tentative subdivision map for the Denali Subdivision.

The second tentative subdivision map, the Cerri Subdivision, would subdivide the southern 160.43-acres of the Project site into 656 single family residential lots. Lot sizes within the Cerri Subdivision would range from 3,808 square feet to 14,883 square feet. An approximately 9.0-acre park/basin area would be located in the southern portion of the Cerri Subdivision. See Figure 2.0-8c for the tentative subdivision map for the Cerri Subdivision.

Additionally, 11.59-acres of the Project site would be developed into a maximum of 290 HDR multifamily residential unit development. A Site Plan Review application for the HDR portion of the Project has not been completed. The land use and development standards for the proposed residential development areas shall comply with all requirements that apply to the corresponding zoning in the Manteca Municipal Code.

COMMERCIAL DEVELOPMENT AREA

The proposed Project would include development of up to 237,838 square feet of GC uses on approximately 13.0 acres in the northernmost portion of the Project site. A tentative subdivision map or a development proposal for the GC portion of the Project has not been completed. The GC site provides an opportunity to locate retail and services scaled to serve the proposed Project and surrounding neighborhoods to enhance the overall walkability within the Project site and to further minimize reliance on vehicles.

The exact use of the proposed commercial site has not been determined. The City's Zoning Code allows for the following uses within the CG Zoning District: emergency shelter, supportive housing, transitional housing, animal sales and grooming, veterinary facility, indoor fitness and sports facility, outdoor commercial recreation, school, specialized education and training/studio, theatre/auditorium, park-and-ride facility, parking facility, public safety facility, transit facility, utility facility and infrastructure, wireless telecommunication facility (minor), alcoholic beverage sales, building materials store/yard, business support services, child day care center, convenience store, grocery store/supermarket, home improvement supplies, hotel and motel, maintenance and repair of small equipment, massage therapy, medical services (general), mortuary/funeral home, neighborhood market, office, business and professional, personal services, restaurant, retail (general), auto part sales, car washing and detailing, manufacturing (small scale), and recycling facility (collection). Other uses within the CG Zoning District are also conditionally permitted with a Conditional Use Permit. As shown in Table 2.0-2, at full build-out, the 13.0-acre commercial site would provide up to 237,838 square feet of commercial uses.

PARKS AND OPEN SPACE

As shown in Figures 2.0-8b and 2.0-8c, approximately 16.06 acres of park and recreation facilities will be provided within the Project site in a variety of forms, consistent with the City's General Plan. Additionally, approximately 6.77 acres of open space would remain in the southeastern corner of the Cerri subdivision. After dedication to the City, the parks, parkways, and recreation facilities will be under the jurisdiction of the City, and will be operated and maintained by the City for the enjoyment of the residents of Manteca. Maintenance will be funded through a services community facilities district. The park sites shown on Figures 2.0-8b and 2.0-8c indicate conceptual park locations. Actual locations of parks and dual use basins may change as the Project site is developed. Parks and parkways are shown for reference only. Parks may include community or neighborhood parks with active and passive components as approved by the City. Park acreage and facilities shall occur within the Project site in a variety of forms as determined by the City during the mapping and improvement plan process. Parks may feature play fields, children play areas, picnic areas, ball courts, open lawn areas, or other amenities. Park areas will be designed in conjunction with storm water basins.

CIRCULATION

The proposed Project will participate with and expand the existing circulation system in the City of Manteca. Additionally, the Project will provide sidewalks and bike lanes to offer additional bicycling and walking facilities for all of Manteca's residents. The Project site is a natural progression of the existing housing areas and street network on the south side of the City and ties directly to the existing roadway

network. The Project site is bordered on the north by an existing dirt roadway between Bronzan Road and Atherton Drive, on the east by South McKinley Avenue and an existing residential subdivision, on the south by existing agricultural fields, and on the west by existing agricultural fields and the future Atherton Drive right-of-way.

The proposed Project includes a hierarchy of roadways to increase the capacity of the existing street network as well as provide additional vehicular access to new residential areas within the Project site that will also benefit the vehicular circulation for the entire City. As shown in Figure 2.0-8a, the main arterial roadways of Atherton Drive, Woodward Avenue, and McKinley Avenue will remain as the key access roads for the Project. Additionally, a portion of Atherton Drive and McKinley Avenue will be included through the Project site in the overall circulation plan per the City's General Plan Circulation Element. As shown in Figure 2.0-8b, a portion of the existing McKinley Avenue right-of-way located adjacent west of the Project site will be abandoned, while the southern portion of McKinley Avenue north of Woodward Avenue within the Project site will be improved and renamed. This off-site improvement is located within city-owned right-of-way.

The neighborhoods within the Project site will include entry drives, residential collectors, and residential streets to provide a comprehensive network of streets to provide vehicular access into and through the site. Additionally, sidewalks and bicycle lanes shall be provided in conjunction with the design of the vehicular circulation to offer a safe, aesthetic, and preferred alternative to reliance on the car. Further, a north-south separated bicycle/walking paths would be provided within the Cerri subdivision, which would connect to the proposed 9.0-acre park/basin area.

GENERAL PLAN AMENDMENT

The proposed Project would require a City of Manteca General Plan Amendment to the Land Use Element to change land uses on the Project site. Changes to the Land Use Element would include changing approximately 121.67 acres of BIP to LDR uses; changing approximately 70.0 acres of UR-BIP to LDR uses; changing approximately 9.39 acres of UR-VLDR to LDR uses; changing approximately 23.41 acres of CMU to LDR uses; changing approximately 11.59 acres of BIP to HDR uses; maintaining approximately 13.0 acres as GC; and maintaining approximately 6.77 acres of OS. It is noted that parks would be permitted within the proposed LDR uses. Figure 2.0-6 illustrates the current Manteca General Plan land uses within the Project site. The proposed General Plan land uses are shown on Figure 2.0-9.

ZONING AMENDMENT

The Project site is currently within the jurisdiction of the City of Manteca. The land uses as proposed are not consistent with the Manteca Zoning Code and, thus, the proposed Project would require a City of Manteca Zoning Amendment to change land uses on the Project site. Changes to the Zoning Map would include changing approximately 79.39 acres of UND to One-Family Dwelling (R-1) uses; changing approximately 121.67 acres of BIP to R-1 uses; changing approximately 23.41 acres of CMU to R-1 uses; approximately 11.59 acres of BIP to Multiple-Family Dwelling (R-3) uses; maintaining approximately 13.0 acres as CG; and maintaining approximately 6.77 acres of OS. The proposed zoning for the Project site is shown on Figure 2.0-10.

TENTATIVE SUBDIVISION MAPS

As noted previously, the proposed Project site would ultimately be divided into two tentative subdivision maps. One tentative subdivision map, the Cerri Subdivision, would subdivide the southern 160.43-acres of the Project site into 656 single family residential lots with an approximately 9.0-acre park/basin area. The second subdivision map, the Denali Subdivision, would subdivide the northern 83.09-acres of the Project site into 319 single family residential lots with a 6.06-acre park/basin area, a 1.0-acre upland play area, 6.77 acres of open space, and two commercial lots for future development.

UTILITIES AND PLANNED INFRASTRUCTURE IMPROVEMENTS

The construction of on-site infrastructure improvements would be required to accommodate development of the proposed Project, as described below.

Potable Water System: As shown in Figure 2.0-11, development areas proposed by the Project would be served by a new potable water distribution system. Development of the proposed potable water system will require the installation of additional water mains within the proposed roadways to comply with the 2005 City of Manteca Master Water Plan. Additionally, a potable well site would be installed within the Cerri subdivision to the southwest of the proposed park/basin. The proposed on-site water distribution system will have various points-of-connection to the City mains. Each will connect to the existing water main lines in Atherton Drive, Woodward Avenue, McKinley Avenue, and Bronzan Road. Additionally, an internally looped system of water lines will be installed within the Project site. A water system analysis will be prepared during future design phases to monitor compliance with City of Manteca fire flow and pressure standards.

The proposed water distribution system may utilize Best Management Practices (BMP) and design control features, including the following Low Impact Development (LID) measures:

1. Implementation of the City of Manteca water recycling program for irrigation of public areas.
2. Irrigation system designs may include “purple pipe” for distribution of recycled water.
3. Reduction of turf areas on lots.
4. Use of rain gardens on lots and in public areas.
5. Use of drought-resistant vegetation in landscaping on lots and public areas.
6. Use of native trees and vegetation for landscaping on lots and in public areas.
7. Lot designs may include features that receive roof runoff from downspouts and provide for reuse of rainwater for irrigation.

Non-Potable Water: As shown in Figure 2.0-11, Project site development would include the development of an on-site non-potable water distribution system that would eventually provide irrigation water to planned parks, open space, and landscaped areas. All landscape irrigation is to be installed with non-potable components.

Connection from all irrigation systems to the non-potable water service will be provided in the proposed streets. This connection is to be provided per the requirements of the City Water Division with a valve whether the irrigation is provided by a well or not. In the future, when the non-potable system is charged by the City, the irrigation will be provided by the non-potable water system with the irrigation

well remaining as a back-up only. Irrigation shall be designed to maximize efficiency and meet the requirements of the City Parks Maintenance Division.

Wastewater System: As shown in Figure 2.0-11, development areas proposed by the Project would be served by a new wastewater distribution system. As shown in Figure 2.0-11, a temporary sewer lift station would be developed in the northern corner of the park/basin area within the Cerri subdivision. The proposed wastewater conveyance facilities would connect to the existing and planned City of Manteca collection and treatment system. For example, as shown in Figure 2.0-11, sewer within the Cerri subdivision would connect to the "Trail of Manteca" Project regional sewer lift station adjacent west of the Project site.

Wastewater treatment would be provided at the City's existing Wastewater Quality Control Facility (WQCF) at 2450 West Yosemite Avenue in western Manteca. The Project site is located within the South Manteca Collection Shed (SMCS). The backbone of the SMCS is the South Manteca Trunk Sewer (SMTS) along Woodward Avenue. The construction of a deep sewer along Woodward Avenue allows for future abandonment of Woodward Park Pump Station and would accommodate development while minimizing construction of infrastructure in South Manteca. Several sections of the SMCS have been constructed or designed in preparation for construction. Phased construction of the network within this shed will occur as development progresses. Interim facilities for conveying the effluent from the South Manteca Collection Area include:

1. The existing 12-inch and 18-inch Woodward Force Main (WFM) which extends from the Woodward Park Pump Station to the WQCF.
2. The existing Tara Park Pump Station and Airport-Daniel Lift Station that connects to the WFM. Eventually, the trunk sewer network in Woodward Avenue and beyond to the WQCF will be completed.
3. The existing Antigua Way Lift Station and existing Bella Vista Lift Station. Eventually, effluent from these two facilities will be re-pumped by the Terra Park Pump Station to the WFM.

The following existing sanitary sewer facilities have been constructed in Woodward Avenue:

1. An existing 30-inch diameter gravity sanitary sewer line extending from Atherton Drive west to South Main Street.
2. An existing 12-inch diameter sanitary sewer force main extending from South Main Street west to McKinley Avenue.

Storm Drainage: As shown in Figure 2.0-11, development of the proposed Project would include construction of a new storm drainage system, including a drainage collection system, storm drain pump stations, and detention basins. It is noted that the locations of the proposed detention basins are conceptual. Stormwater resulting from the future HDR portion of the Project would be diverted to the Oakwood Trails Subdivision storm drainage system, which will be developed adjacent west of the Project site in the future. The Oakwood Trails Subdivision includes two neighborhood park drainage basins, totaling approximately 15.67 acres.

Installation of the Project's storm drainage system will be subject to current City of Manteca Design Specifications and Standards. The proposed storm drainage collection and detention system will be

subject to the State Water Resources Control Board Requirements (SWRCB) and City of Manteca regulations, including: Manteca Storm Drain Master Plan, 2013; Phase II, National Pollutant Discharge Elimination System (NPDES) Permit Requirements; NPDES-MS4 Permit Requirements; and LID Guidelines.

Stormwater quality standards imposed and monitored by the Environmental Protection Agency (EPA) and the SWRCB through the City's NPDES permit require treatment of stormwater runoff prior to its release into natural drainage features or dual use South San Joaquin Irrigation District (SSJID) and City Laterals. Stormwater quality is an integral part of the City's stormwater management system. Most existing stormwater is pumped into the dual use SSJID and City laterals and drains.

The City requires detention basins to help attenuate peak flows before drainage discharge is pumped into SSJID's facilities. Delaying the release of water over longer periods of time further reduces the potential of downstream flooding. The proposed detention basins are joint-use facilities providing recreation and other uses when not being used for stormwater detention.

Regulated Public Utilities: Electrical, gas, phone, cable and related internet services would be extended to all portions of the Project site from existing facilities located along Woodward Avenue, McKinley Avenue, Bronzan Road, Atherton Drive, or other utility systems in the Project site. Proposed utilities would be located within public utility easements to be dedicated along street frontages. Utility improvements would be installed in conjunction with planned street improvements.

2.5 USES OF THE EIR AND REQUIRED AGENCY APPROVALS

This EIR may be used for the following direct and indirect approvals and permits associated with adoption and implementation of the proposed Project.

CITY OF MANTECA

The City of Manteca will be the Lead Agency for the proposed Project, pursuant to the State Guidelines for Implementation of CEQA, Section 15050. Actions that would be required from the City include, but are not limited to the following:

- Certification of the EIR;
- Adoption of the Mitigation Monitoring and Reporting Program;
- Approval of City of Manteca General Plan Amendment (Land Use Element);
- Approval of City of Manteca Zoning Amendment;
- Approval of Improvement Plans;
- Approval of Grading Plans;
- Approval of Building Permits;
- Approval of future site plan review;
- Approval of future tentative and final map(s);
- Issuance of grading, encroachment, and building permits;
- City review and approval of Project utility plans;

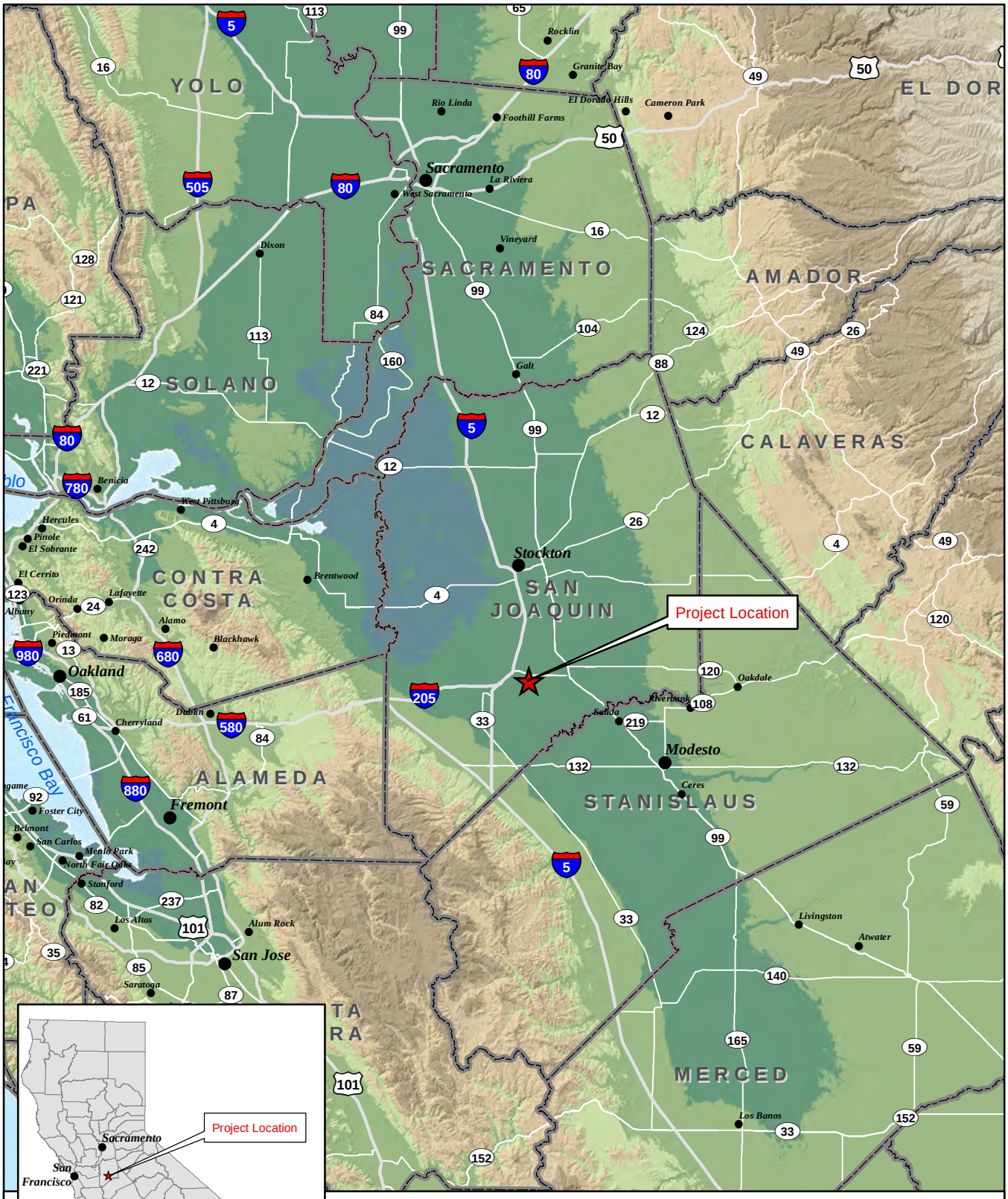
- Formation of a finance district (i.e. Community Facilities District [CFD] or other finance district); and
- Formation of, or annexation into, a CFD.

OTHER GOVERNMENTAL AGENCY APPROVALS

The following agencies may be required to issue permits or approve certain aspects of the proposed Project. Other governmental agencies that may require approval include, but are not limited to, the following:

- Central Valley Regional Water Quality Control Board (CVRWQCB) - Storm Water Pollution Prevention Plan (SWPPP) approval prior to construction activities pursuant to the Clean Water Act;
- San Joaquin Valley Air Pollution Control District (SJVAPCD) - Approval of construction-related air quality permits;
- SJVAPCD - Authority to Construct, Permit to Operate for stationary sources of air pollution; and
- SJCOG, Inc. (SJCOG) - Issuance of incidental take permit under the San Joaquin Multi-Species Habitat Conservation and Open Space Plan (SJMSCP).

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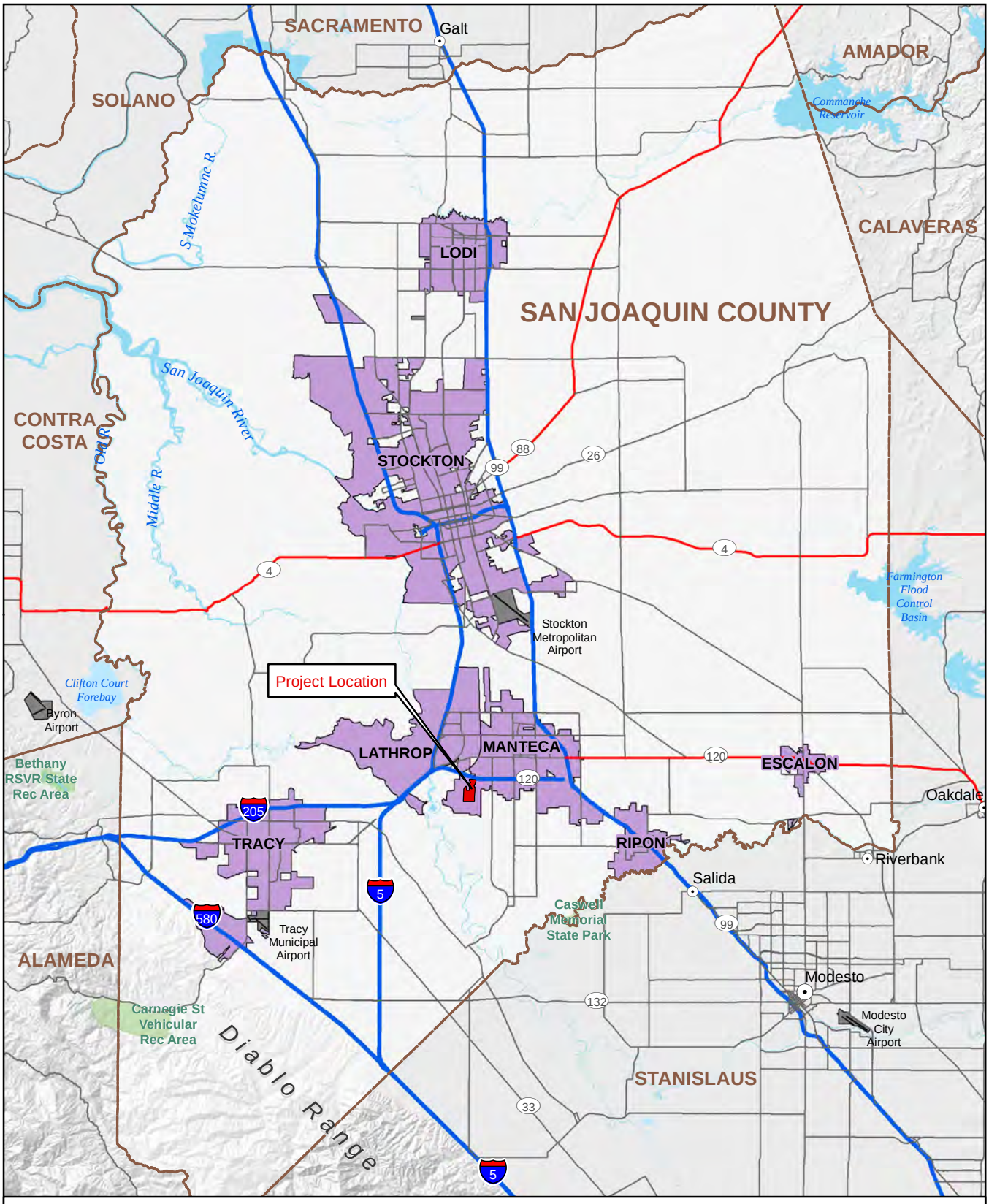
OAKWOOD LANDING

Figure 2.0-1: Regional Location Map

Sources: CalAtlas. Map date: July 13, 2016.

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OAKWOOD LANDING

Figure 2.0-2: Project Vicinity Map

Legend

- Project Area
- Cities within San Joaquin County

N

0 1 2 4

Miles

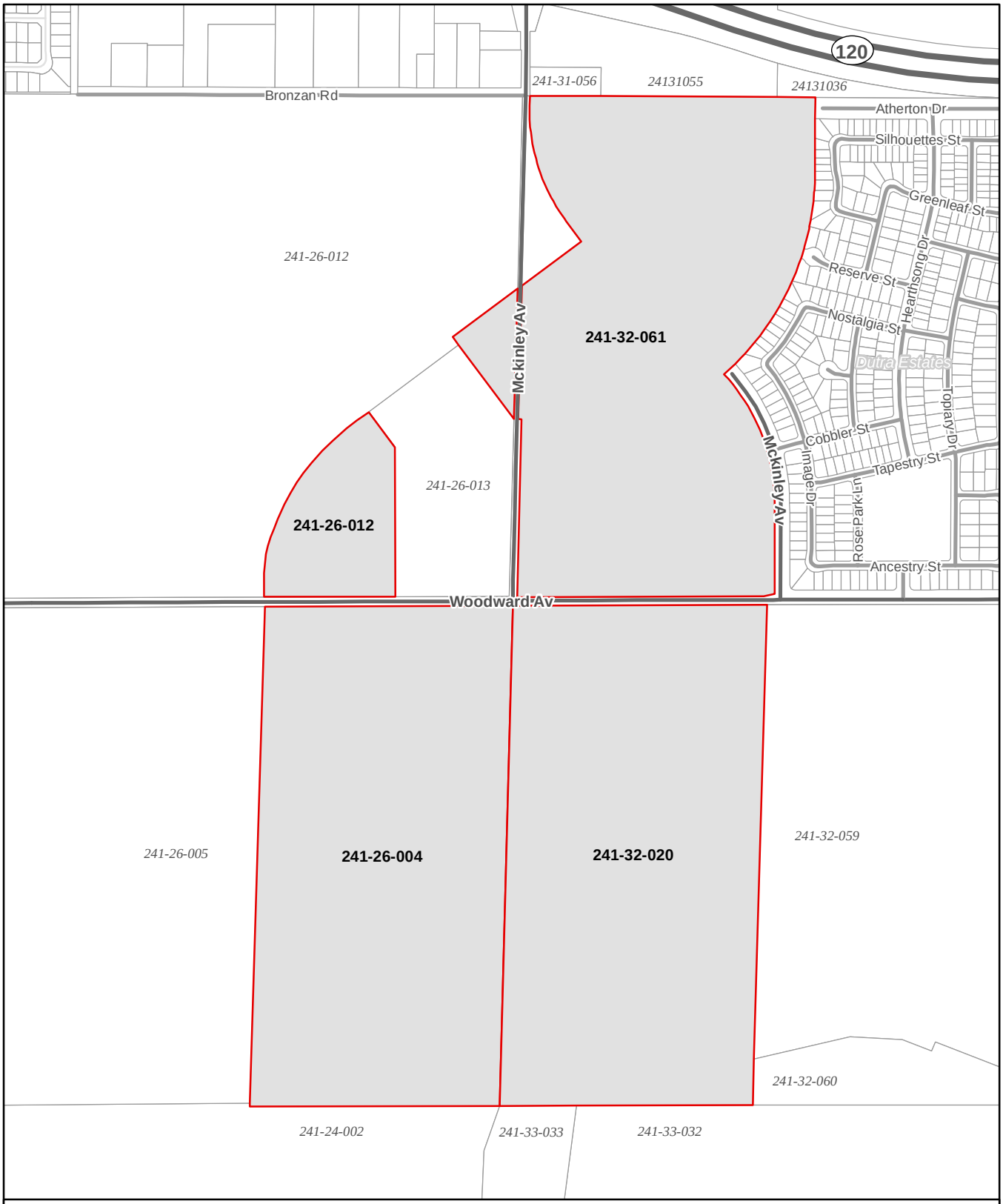
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Data sources: CalAtlas; ESRI StreetMap North America; San Joaquin County GIS. Map date: July 13, 2016.

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OAKWOOD LANDING

Figure 2.0-3: Assessor's Parcel Map

Legend

Project Parcels

N

0 250 500

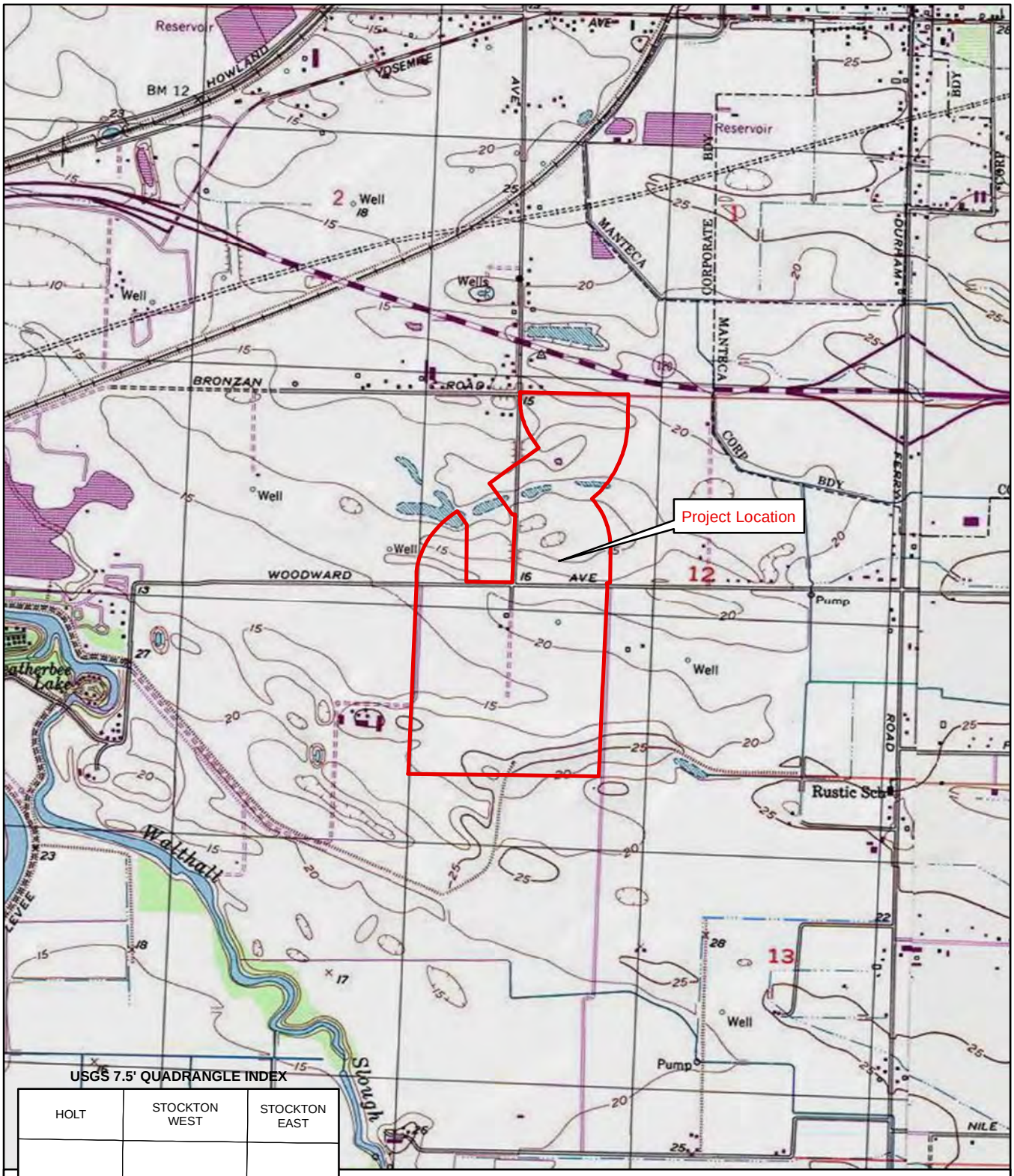
Feet

1:9,000

Sources: San Joaquin County GIS Parcels boundary layer, April 2016; ArcGIS Online Imagery Map Service.
Map date: July 13, 2016.

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USGS 7.5' QUADRANGLE INDEX

HOLT	STOCKTON WEST	STOCKTON EAST
UNION ISLAND	LATHROP	MANTECA
TRACY	VERNALIS	RIPON

0 500 1,000
Feet
1:24,000

OAKWOOD LANDING

Figure 2.0-4: USGS Topographic Map

Lathrop Quadrangle

Data sources: San Joaquin County GIS; ArcGIS Online USGS Topographic Map Service. Map date: July 13, 2016.

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OAKWOOD LANDING

Figure 2.0-5: Aerial View of Project Site

Legend

Project Boundary

N

0 375 750

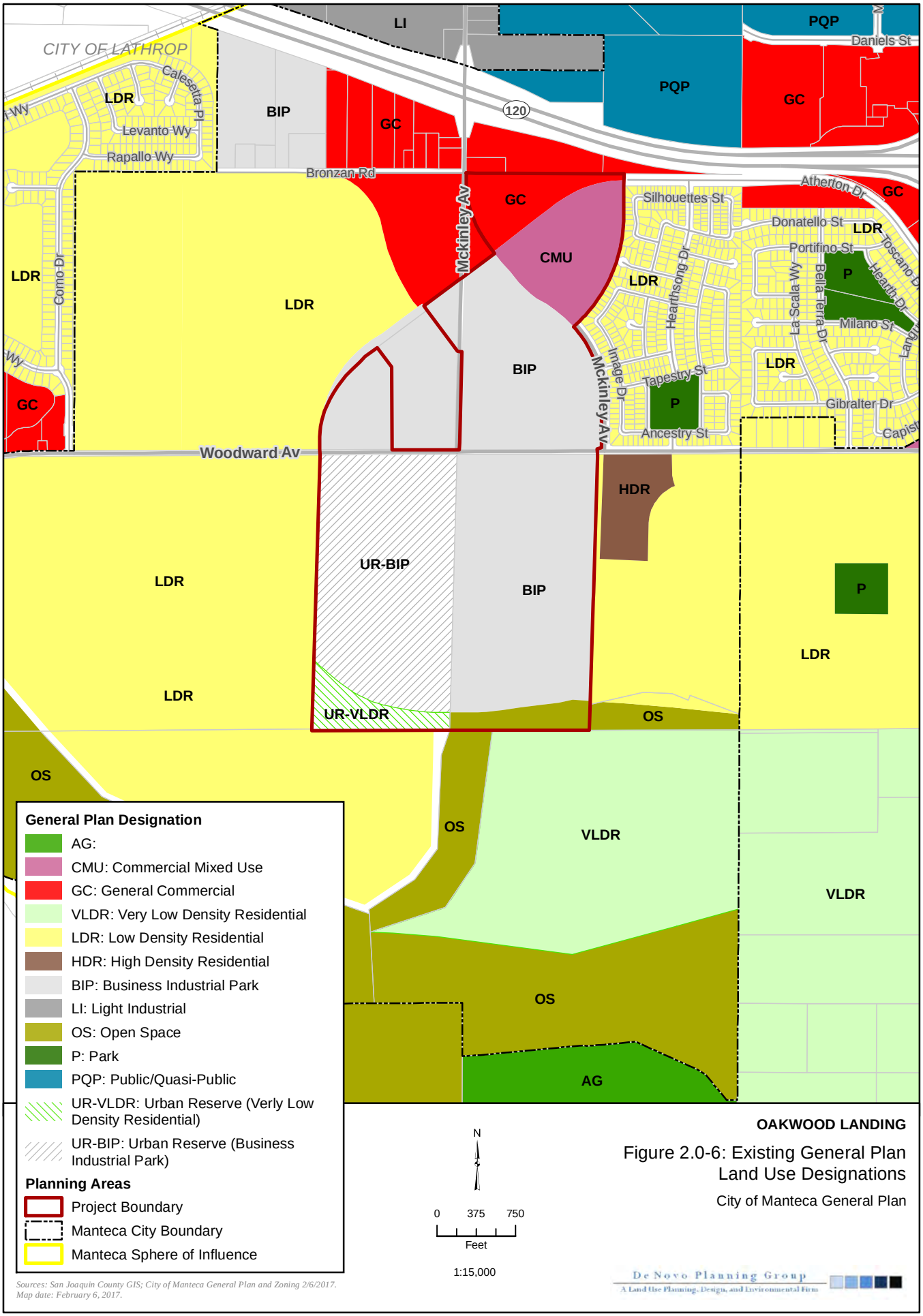
Feet

1:18,000

Sources: San Joaquin County GIS; ArcGIS Online Imagery Map Service. Map date: July 13, 2016.

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Sources: San Joaquin County GIS; City of Manteca General Plan and Zoning 2/6/2017.
Map date: February 6, 2017.

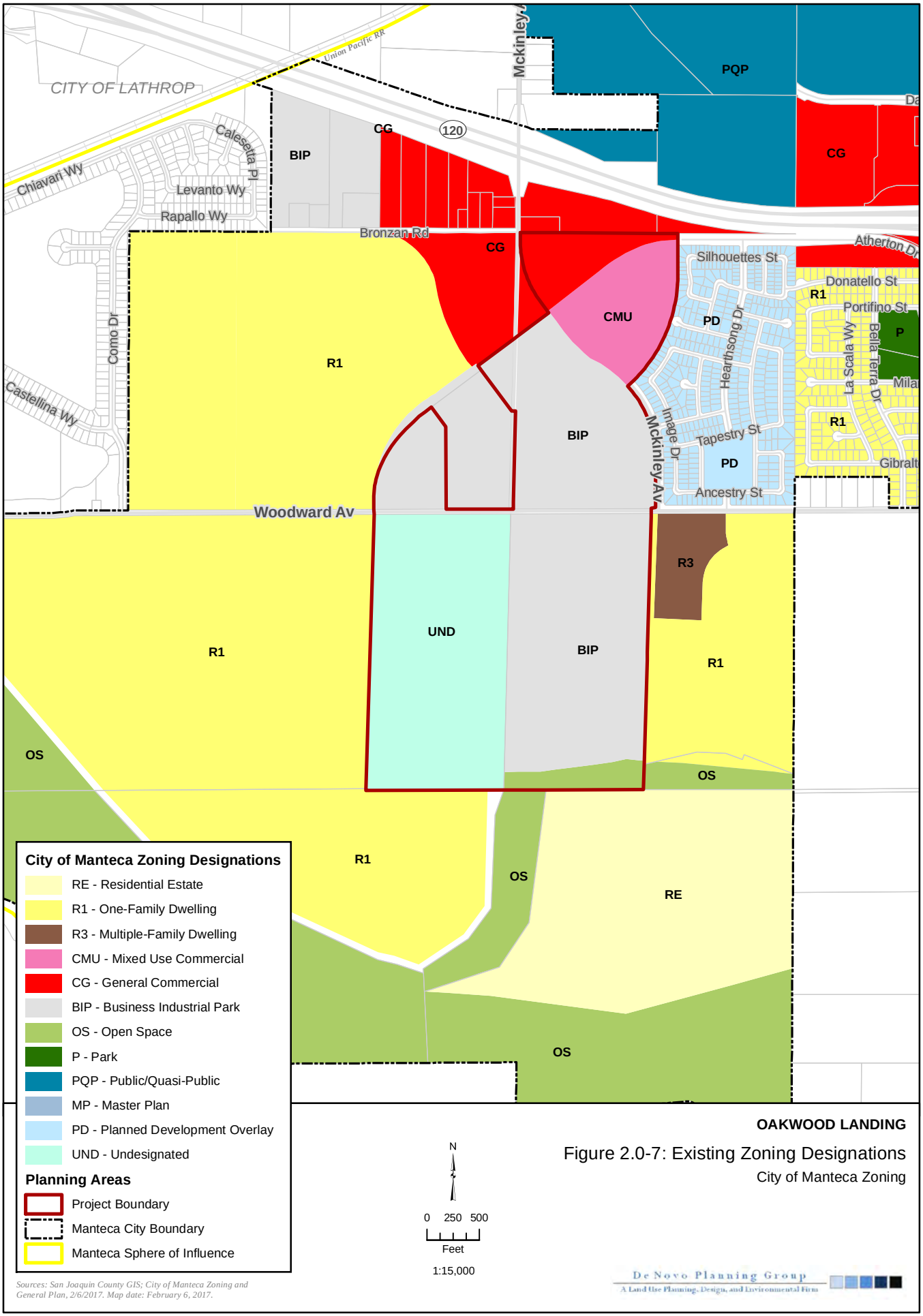
OAKWOOD LANDING

Figure 2.0-6: Existing General Plan Land Use Designations

City of Manteca General Plan

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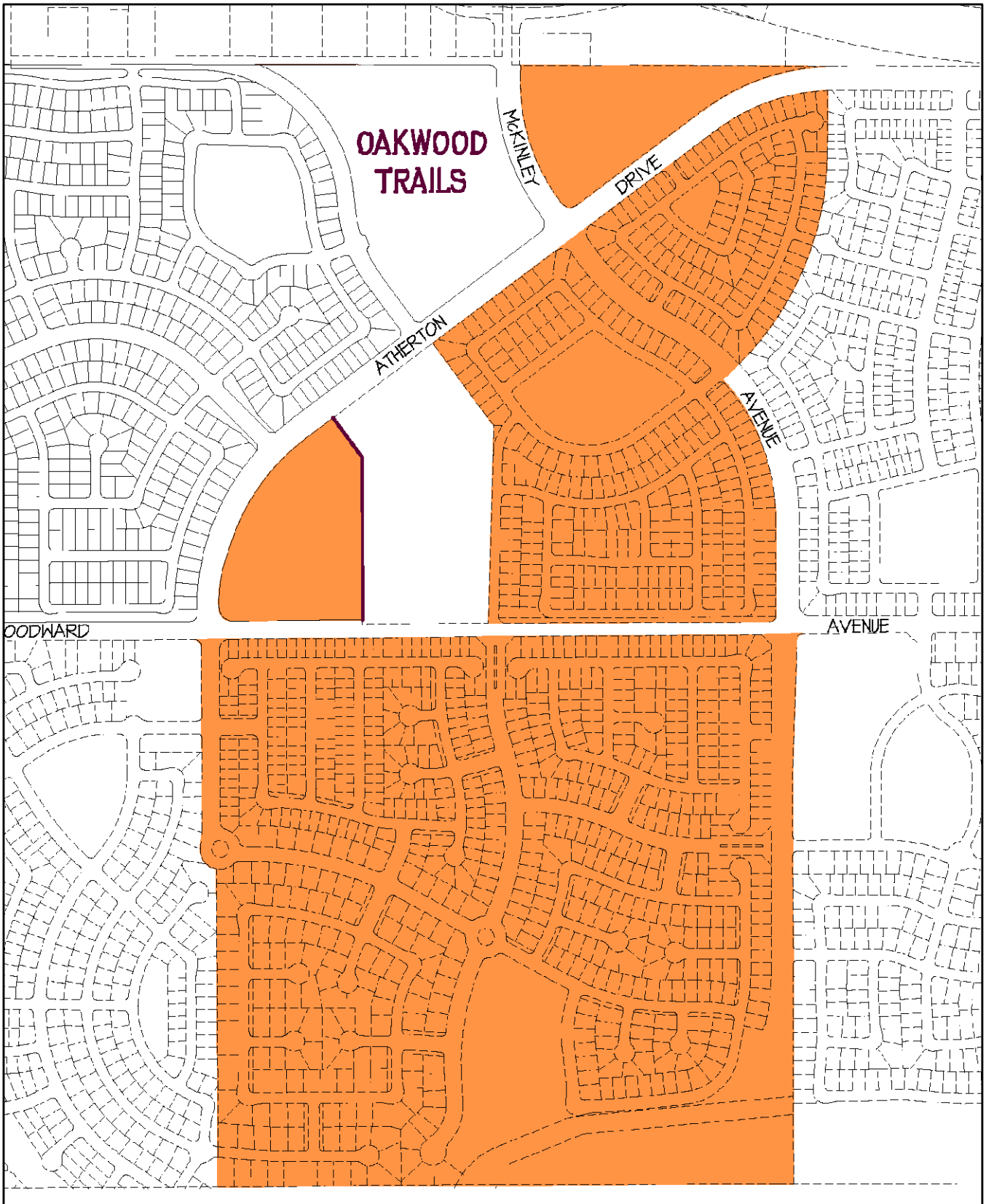


OAKWOOD LANDING

Figure 2.0-7: Existing Zoning Designations

City of Manteca Zoning

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Legend

Properties within the EIR of Oakwood Landing

N

0 250 500

Feet

1:8,000

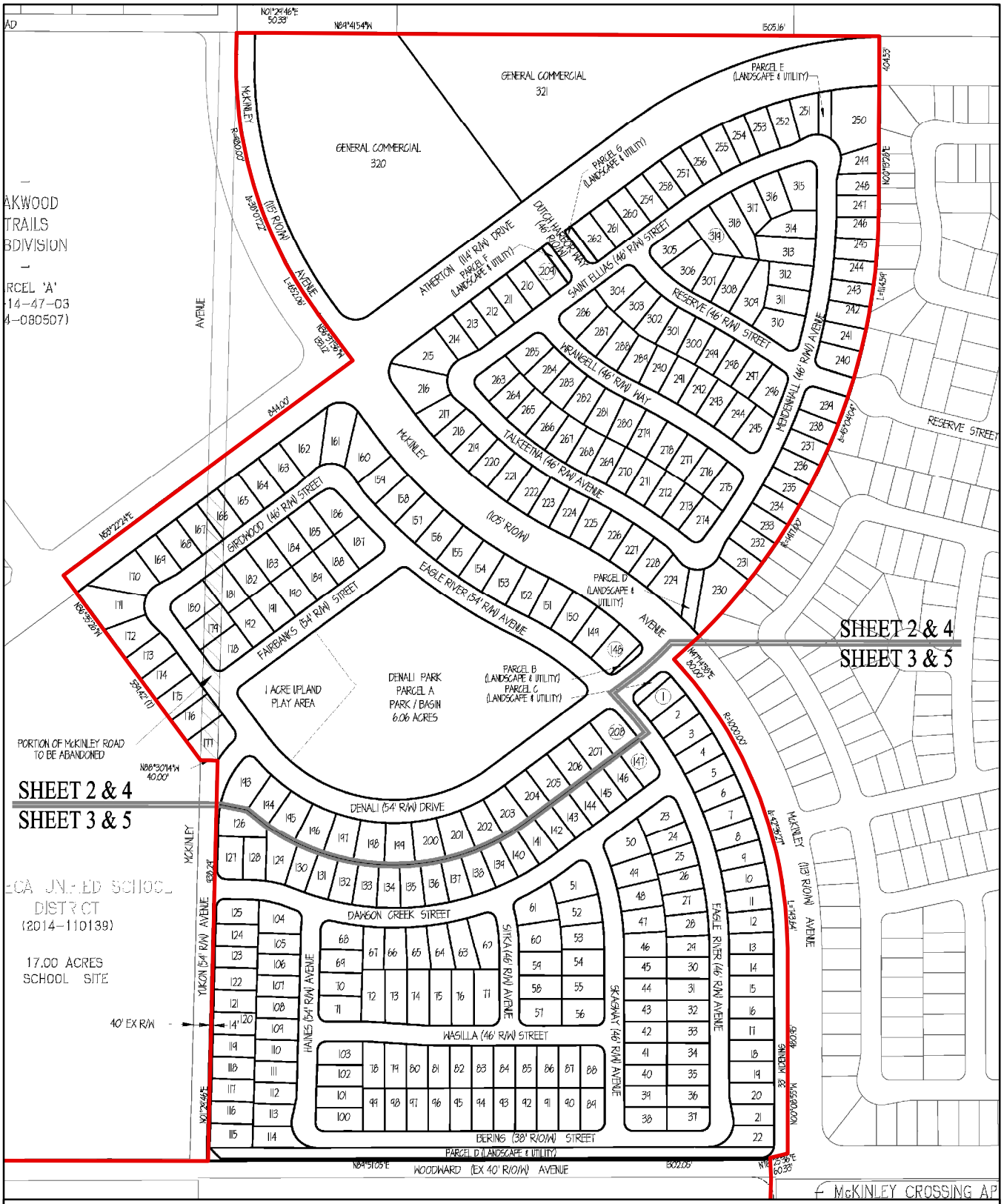
OAKWOOD LANDING

Figure 2.0-8a:
Oakwood Landing Tentative Map

Sources: RLC Associates, July 11, 2016: Properties within the E.I.R. of Oakwood Landing. Map date: July 13, 2016.

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OAKWOOD LANDING

Figure 2.0-8b: Denali Subdivsion Tentative Map

Legend

Project Boundary

N

0 100 200

Feet

1:4,000

Sources: Vesting Tentative Map Denali Tract No. 3845, RLC Associates, December 10, 2015, updated February 29, 2016; San Joaquin County GIS. Map date: July 13, 2016.

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Legend

Project Boundary

N

0 100 200

Feet

1:4,800

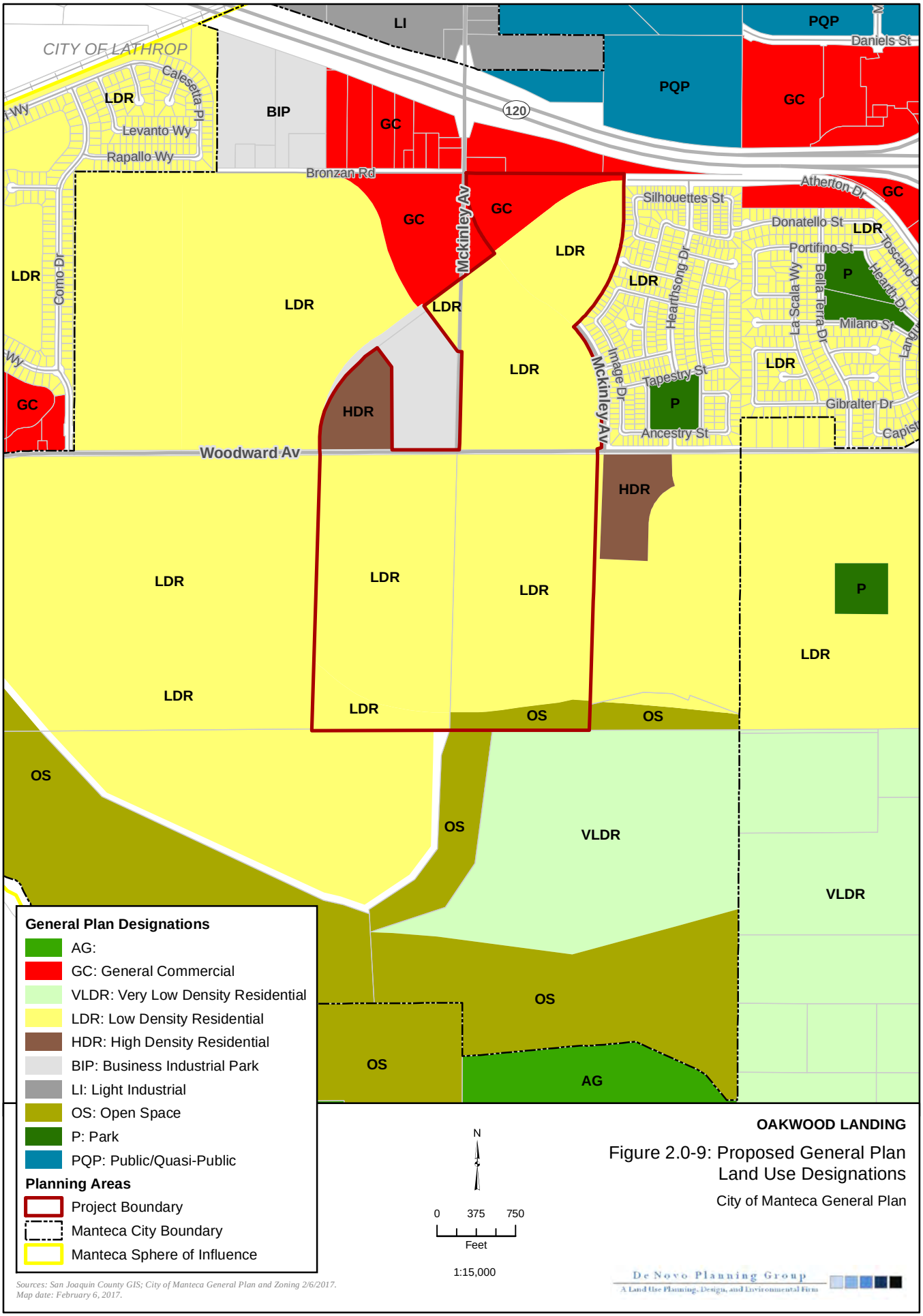
OAKWOOD LANDING

Figure 2.0-8c: Cerri Subdivsion Tentative Map

Sources: Cerri Residential Subdivision, Tentative Subdivision Map, Manteca, California, Northstar Engineering Group, July 12, 2016. San Joaquin County GIS. Map date: July 13, 2016.

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Sources: San Joaquin County GIS; City of Manteca General Plan and Zoning 2/6/2017.
Map date: February 6, 2017.

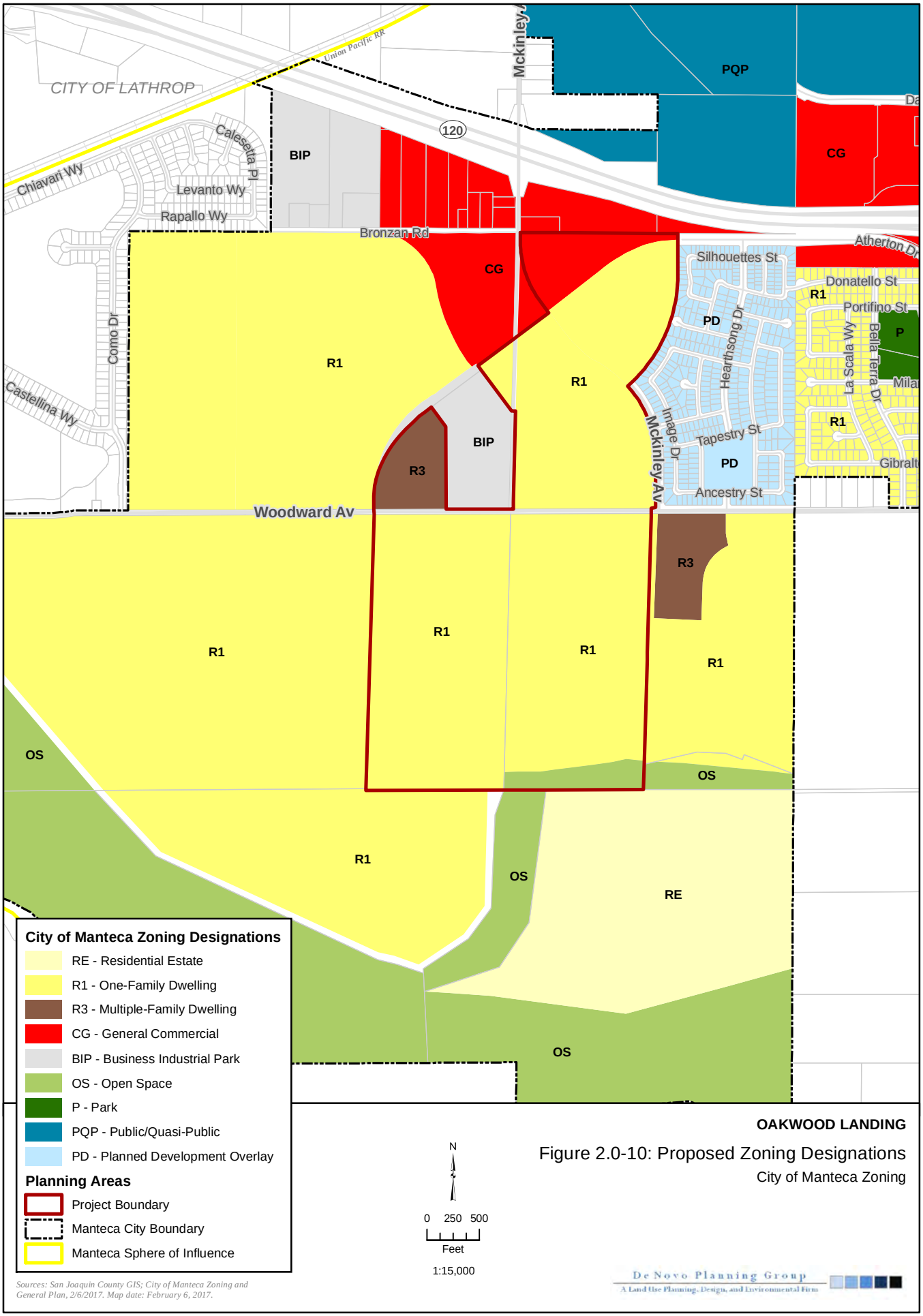
OAKWOOD LANDING

Figure 2.0-9: Proposed General Plan Land Use Designations

City of Manteca General Plan

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OAKWOOD LANDING

Figure 2.0-10: Proposed Zoning Designations

City of Manteca Zoning

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LEGEND

W	WATER LINE
8"NP	NON–POTABLE WATER LINE
SS	SANITARY SEWER LINE
SD	STORM DRAIN LINE

200 100 0 200

1" = 200'

OAKWOOD LANDING

Figure 2.0-11. Proposed Utility Plan

Source: North Star Engineering, Inc., March 22, 2017. Map date: April 19, 2017.

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This section provides an overview of the visual character, scenic resources, views, scenic highways, and sources of light and glare that are encountered on the Project site and the vicinity. This section concludes with an evaluation of the impacts and recommendations for mitigating impacts. There were no comments received during the NOP scoping process related to this environmental topic.

3.1.1 ENVIRONMENTAL SETTING

REGIONAL SCENIC RESOURCES

Visual resources are generally classified into two categories: scenic views and scenic resources. Scenic views are elements of the broader viewshed such as mountain ranges, valleys, and ridgelines. They are usually mid-ground or background elements of a viewshed that can be seen from a range of viewpoints, often along a roadway or other corridor. Scenic resources are specific features of a viewing area (or viewshed) such as trees, rock outcroppings, and historic buildings. They are specific features that act as the focal point of a viewshed and are usually foreground elements.

Aesthetically significant features occur in a diverse array of environments within the region, ranging in character from urban centers to rural agricultural lands to natural water bodies. Features of the built environment that may also have visual significance include individual or groups of structures that are distinctive due to their aesthetic, historical, social, or cultural significance or characteristics. Examples of the visually significant built environment may include bridges or overpasses, architecturally appealing buildings or groups of buildings, landscaped freeways, and a location where a historic event occurred.

SCENIC HIGHWAYS AND CORRIDORS

Scenic highways and corridors make major contributions to the quality of life enjoyed by the residents of a region. The development of community pride, the enhancement of property values, and the protection of aesthetically-pleasing open spaces reflecting a preference for the local lifestyle are all ways in which scenic corridors are valuable to residents.

Scenic highways and corridors can also strengthen the tourist industry. For many visitors, highway corridors will provide their only experience of the region. Enhancement and protection of these corridors ensures that the tourist experience continues to be a positive one and, consequently, provides support for the tourist-related activities of the region's economy.

Scenic Highways

A scenic highway is generally defined by Caltrans as a public highway that traverses an area of outstanding scenic quality, containing striking views, flora, geology, or other unique natural attributes. A highway may be designated scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view.

The status of a proposed state scenic highway changes from eligible to officially designated when the local governing body applies to Caltrans for scenic highway approval, adopts a Corridor Protection Program, and receives notification that the highway has been officially designated a Scenic Highway.

Scenic Corridors

A scenic corridor is the view from the road that may include a distant panorama and/or the immediate roadside area. A scenic corridor encompasses the outstanding natural features and landscapes that are considered scenic. It is the visual quality of the man-made or natural environments within a scenic corridor that are responsible for its scenic value. Commonly, the physical limits of a scenic corridor are broken down into foreground views (zero to one quarter mile) and distant views (over one quarter mile). In addition to distinct foreground and distant views, the visual quality of a scenic corridor is defined by special features, which include:

- Focal points - prominent natural or man-made features which immediately catch the eye.
- Transition areas - locations where the visual environment changes dramatically.
- Gateways - locations which mark the entrance to a community or geographic area.

San Joaquin County Scenic Highways/Corridors

Only one highway section in San Joaquin County is listed as a Designated Scenic Highway by the Caltrans Scenic Highway Mapping System; the segment of State Route 580 from Interstate 5 to State Route 205. This route traverses the edge of the Coast Range to the west and Central Valley to the east. The City of Manteca and the Project site are not visible from this roadway segment.

As identified in the Open Space Element of the San Joaquin County General Plan, designated scenic routes in the county include Interstate 5 from the Sacramento County line south to Stockton. The City of Manteca is located south of Stockton, and neither the City nor the Project site is visible from this segment of Interstate 5.

SCENIC WATER RESOURCES AND WILD AND SCENIC RIVERS

Water resources are important visual resources that draw tourists to the area for recreational opportunities. The most visually significant water body in the region is the San Joaquin River.

Wild and Scenic Rivers

Federal agencies have jurisdiction, under the Wild and Scenic Rivers Act, to designate rivers or river sections to "be preserved in free-flowing condition and…protected for the benefit and enjoyment of present and future generations."

The San Joaquin River is not designated as Wild and Scenic River under the Federal Wild and Scenic Rivers Act.

PROJECT SITE

The Project site is located in the southwestern portion of the City of Manteca City Limits. The Project site is located south of State Route (SR) 120, approximately 2.8 miles southwest of downtown Manteca. Figures 2.0-1 and 2.0-2 illustrate the regional location and Project vicinity.

The Project site encompasses approximately 258.29 acres of existing agricultural uses. The Project site has some existing improvements including an existing barn area with associated equipment, dirt and paved roadways, and irrigation ditches. The majority of the Project site is in active agricultural use. The barn structure is located in the central portion of the Project site. Additionally, Woodward Avenue traverses the center of the Project site from east to west, and McKinley Avenue traverses the northern portion of the Project site from north to south. The Project site is relatively flat and ranges in elevation from approximately 20 to 30 feet above sea level as shown in Figure 2.0-4.

As a result of site disturbance associated with agricultural operations/farming, limited natural scenic areas can be found within the Project site. There is little native vegetation or naturalized habitat located on the site, and the flat topography of the site renders the site essentially void of prominent natural visual features.

Much of the Project site is active agricultural land. While this land is disturbed from its natural condition, developed agricultural land can provide visual relief to a passerby/viewer from common manmade structures and visual obstructions found in an urban environment. Agricultural lands provide a sense of openness that is common in natural environments. Throughout the year agricultural operations would result in the land evolving from an environment that appears lush with vegetation (green crops) to an environment that appears barren (recently tilled). Agricultural land in California's Great Central Valley is generally accepted as an important visual resource.

The Project site is surrounded by a variety of designated undeveloped and existing developed land uses. The Project site is bounded on the north by an existing dirt roadway between Bronzan Road and Atherton Drive, on the east by South McKinley Avenue and an existing residential subdivision, on the south by existing agricultural fields, and on the west by existing agricultural fields and the future Atherton Drive right-of-way. Uses immediately adjacent to the east, south, and west of the Project site include agricultural and residential uses, including ranchettes and large estates lots. Other existing uses east of the northerly portion of the Project site include a single family residential subdivision west of South Airport Way. Existing and future residential subdivisions also exist to the west of the Project site. Other nearby uses include rural residential uses north of the Project site and south of SR 120.

Lands to the north of the Project site are designated Business Industrial Park (BIP), General Commercial (GC), and Low Density Residential (LDR). Lands to the east of the Project site are designated LDR, Park (P), Open Space (OS), GC, and High Density Residential (HDR). Lands to the south of the Project site are designated OS, Urban Reserve (Very Low Density Residential) (UR-VLRD), Agriculture (AG), and LDR. Lands to the west of the Project site are designated GC, LDR, and OS.

There are no Officially Designated Scenic Highways located through or adjacent to the Project site. The only Officially Designated Scenic Highway in San Joaquin County is I-580 from I-5 to SR 205 located approximately 12 miles southwest of the Project site. This scenic highway is not visible from the Project site.

There are minimal existing light sources on the Project site. One barn structure is located in the central portion of the Project site. This barn appears to be abandoned and does not contain existing sources of light. Other structures are not located on-site. Other existing lighting in the vicinity of the Project site includes: roadway lighting on State Route (SR) 120 and Atherton Drive, and lighting from residential areas to the north and east of the Project site.

3.1.2 REGULATORY SETTING

STATE

California Scenic Highway Program

The intent of the California Scenic Highway Program is "to protect and enhance California's natural scenic beauty and to protect the social and economic values provided by the State's scenic resources." Caltrans administers the program, which was established in 1963 and is governed by the California Streets and Highways Code §260 et seq. The goal of the program is to preserve and protect scenic highway corridors from changes that would diminish the aesthetic value of the adjacent land. Caltrans has compiled a list of state highways that are designated as scenic and county highways that are officially designated or eligible for designation as scenic. Scenic highway designation can provide several types of benefits to the region. Scenic areas are protected from encroachment of inappropriate land uses, free of billboards, and are generally required to maintain existing contours and preserve important vegetative features. Only low density development is allowed on steep slopes and along ridgelines on scenic highways, and noise setbacks are required for residential development.

LOCAL

The City of Manteca General Plan identifies visual and scenic resources within the city and recommends measures to protect these resources.

City of Manteca General Plan

The City of Manteca General Plan identifies the importance of visual characteristics in establishing community identity. Attractive new land uses along the major highways, new landmarks visible from several vantage points throughout the city, and new gateway features along the highways and other major roads at city boundaries can contribute significantly to establishing a strong positive identity for Manteca.

City of Manteca Zoning Ordinance

Chapter 17.48, Landscaping, of the City Zoning Ordinance contains standards and provisions related to landscaping design requirements that would apply to the proposed Project. The primary

intent of Chapter 17.48, Landscaping, is to require water efficient landscaping and to promote water conservation. However, this chapter also includes provisions related to landscape design that would apply to the proposed Project. These applicable provisions include parking lot landscaping design standards, setback area landscaping standards, and landscaping standards adjacent to fences and walls.

Chapter 17.50, Lighting, of the City Zoning Ordinance contains standards and provisions related to exterior lighting. The primary purpose of this chapter is to regulate lighting to balance the safety and security needs for lighting with the City's desire to preserve dark skies and to ensure that light trespass and glare have negligible impacts on surrounding property (especially residential) and roadways. Section 17.50.070 requires the preparation of an outdoor lighting plan as part of each Site Plan Review application. At a minimum, the outdoor lighting plan shall include the following:

1. Manufacturer specifications sheets, cut sheets, and other manufacturer-provided information for all proposed outdoor light fixtures to show fixture diagrams and outdoor light output levels.

2. The proposed location, mounting height, and aiming point of all outdoor lighting fixtures.

3. If building elevations are proposed for illumination, drawings of all relevant building elevations showing the fixtures, the portions of the elevations to be illuminated, the illumination level of the elevations, and the aiming point for any remote light fixture.

4. Photometric data including a computer-generated photometric grid showing foot-candle readings every 10 feet within the property or site and 10 feet beyond the property lines.

3.1.3 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the proposed Project will have a significant impact on aesthetics if it will:

- Have a substantial adverse effect on a scenic vista;
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
- Substantially degrade the existing visual character or quality of the site and its surroundings;
- Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

IMPACTS AND MITIGATION MEASURES

Impact 3.1-1: Project implementation may result in substantial adverse effects on scenic vistas and resources or substantial degradation of visual character. (Significant and Unavoidable)

Development of the proposed Project would convert the site from its existing use as primarily agricultural land to developed residential housing, a commercial area, two recreation park areas, and one open space area.

Project components would include:

- Construction of up to 975 low density residential units.
- Construction of up to 290 high density residential units.
- Construction of two park areas totaling 16.06 acres and maintenance of 6.77 acres of open space.
- Development of a 13.0-acre General Commercial area with up to 237,838 square feet.
- Construction of roadways, pedestrian pathways, sewers, storm drainage and other public infrastructure to allow for access to and development of the site.

The Project site is not designated as a scenic vista by the City of Manteca General Plan or the San Joaquin County General Plan, nor does it contain any unique or distinguishing features that would qualify the site for designation as a scenic vista. However, the City's General Plan EIR does note that new development will impact current views of open space, which are primarily vistas of agricultural fields and orchards.

The Project site is highly visible from Woodward Avenue, McKinley Avenue, Bronzan Road, Atherton Drive, and Dredger Cut. Implementation of the proposed Project would change the existing visual character of the site from a primarily agricultural site to an urbanized site. Impacts related to a change in visual character are largely subjective and very difficult to quantify. People have different reactions to the visual quality of a project or a project feature, and what is considered "attractive" to one viewer may be considered "unattractive" to other viewers. The Project site currently consists primarily of agricultural lands. Agricultural lands provide visual relief from urban and suburban developments, and help to define the character of a region. The loss of agricultural lands can have an adverse cumulative impact on the overall visual character and quality of a region.

As described above, Project implementation would introduce residential and commercial uses, as well as supporting infrastructure into an area that is currently undeveloped and is primarily occupied by agricultural uses. Implementation of the proposed Project would introduce developed urban land uses into an area that is currently undeveloped and largely void of structures and impervious surfaces.

The proposed Project would include visual components that would assist in enhancing the appearance of the site following site development. These improvements would include landscaping improvements such as new street trees and other vegetation landscaping. The proposed Project would also result in the construction of two park areas totaling 16.06 acres, and one 6.77-acre open space area, which will result in areas of green space within the residential portion of the Project site.

While implementation of the proposed Project would change the existing visual character of the site, it would not result in substantial adverse effects on a designated scenic vista. There are no proposed structures over 45 feet high that would impede views of the surrounding agricultural areas from the Project vicinity.

The proposed Project would result in the conversion of the land from agricultural uses, which would contribute to changes in the regional landscape and visual character of the area. In order to reduce visual impacts, development within the Project site is required to be consistent with the General Plan and the Manteca Zoning Ordinance which includes design standards in order to ensure quality and cohesive design of the Project site. These standards include specifications for building height, massing, and orientation; exterior lighting standards and specifications; and landscaping standards. Implementation of the design standards would ensure quality design throughout the Project site, and result in a Project that would be internally cohesive while maintaining aesthetics similar to surrounding uses.

Nevertheless, the loss of the visual appearance of the existing agricultural land on the site will change the visual character of the Project site in perpetuity. Compliance with the Development Standards For Manteca's Zoning District's for height and bulk, and landscaping requirements found in Chapter 17.48, would reduce visual impacts to the greatest extent feasible; however, the proposed Project would permanently convert the agricultural uses to urbanized uses. This is considered a **significant and unavoidable** impact. There is no additional feasible mitigation available that would reduce this impact to a less than significant level.

Impact 3.1-2: Project implementation may substantially damage scenic resources within a State Scenic Highway (Less than Significant)

There are no designated State Scenic Highways in the vicinity of the Project site. Only one highway section in San Joaquin County is listed as a Designated Scenic Highway by the Caltrans Scenic Highway Mapping System; the segment of Interstate 580 from Interstate 5 to State Route 205. This Designated Scenic Highway is located approximately 12 miles southwest of the Project site and is not visible from the Project site. This route traverses the edge of the Coast Range to the west and Central Valley to the east. The City of Manteca and the Project site are not visible from this roadway segment. As identified in the Open Space Element of the San Joaquin County General Plan, designated scenic routes in the county include Interstate 5 from the Sacramento County line south to Stockton. The City of Manteca is located south of Stockton, and neither the City nor the Project site is visible from this segment of Interstate 5. Additionally, there are no "eligible" highway segments in the Project vicinity that may be included in the State Scenic Highway system. As such, this is a **less than significant** impact, and no mitigation is required.

Impact 3.1-3: Project implementation may result in light and glare impacts (Less than Significant with Mitigation)

Implementation of the proposed Project would introduce new sources of light and glare into the Project site. New sources of glare would occur primarily from the windshields of vehicles travelling to and from the Project site and from vehicles parked at the site. There is also the potential for reflective building materials and windows to result in increases in daytime glare.

A detailed lighting plan has not been prepared for the proposed Project, but for the purposes of this analysis, it has been conservatively assumed that nighttime street lighting, outdoor recreational, and safety lighting will be installed throughout areas of the Project site. It is assumed that security lighting will be installed within the parking areas throughout the commercial area.

The Manteca Municipal Code Chapter 17 (Zoning Code) states that direct glare shall not be permitted, and provides standards for nuisance prevention and shielding requirements. Chapter 17.48 of the Manteca Zoning Ordinance also includes requirements for the installation of parking lot landscaping which further limit glare impacts.

Chapter 17.50, Lighting, of the City Zoning Ordinance contains standards and provisions related to exterior lighting. The primary purpose of this chapter is to regulate lighting to balance the safety and security needs for lighting with the City's desire to preserve dark skies and to ensure that light trespass and glare have negligible impacts on surrounding property (especially residential) and roadways. Section 17.50.070 requires the preparation of an outdoor lighting plan as part of each Site Plan and Design Review application for commercial and industrial properties. At a minimum, the outdoor lighting plan shall include the following:

1. Manufacturer specifications sheets, cut sheets, and other manufacturer-provided information for all proposed outdoor light fixtures to show fixture diagrams and outdoor light output levels.
2. The proposed location, mounting height, and aiming point of all outdoor lighting fixtures.
3. If building elevations are proposed for illumination, drawings of all relevant building elevations showing the fixtures, the portions of the elevations to be illuminated, the illumination level of the elevations, and the aiming point for any remote light fixture.
4. Photometric data including a computer-generated photometric grid showing foot-candle readings every 10 feet within the property or site and 10 feet beyond the property lines.

The Manteca General Plan EIR determined the impact of new sources of light and glare can be minimized by incorporating design features and operating requirements into new developments that limit light and glare. Policy CD-P-44 requires the use of minimal street lighting to meet safety standards and provide direction. Policy CD-P-45 requires the use of directionally shielded lighting for all exterior lighting. Policy CD-P-46 requires automatic shut-off or motion sensors for lighting features in newly developed areas. The City of Manteca Zoning Ordinance has requirements for lighting and glare to reduce the impacts of glare and light trespass.

The proposed Project lighting would be installed as per the City of Manteca standards and specifications, and would be required to incorporate design features to minimize the effects of light and glare. However, without a detailed lighting plan, increase of nighttime lighting is a potentially significant impact. Implementation of Mitigation Measure 3.1-1 would reduce potential impacts associated with nighttime lighting and light spillage onto adjacent properties to a **less than significant** level.

MITIGATION MEASURE(S)

Mitigation Measure 3.1-1*: A lighting plan for all non-residential parcels shall be prepared prior to the approval of the Site Plan review for each phase. The lighting plan shall demonstrate that the lighting systems and other exterior lighting throughout the commercial and industrial portions of the Project site have been designed to minimize light spillage onto adjacent properties to the greatest extent feasible.*

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This section provides an overview of the agricultural crops in San Joaquin County and the City of Manteca, agricultural capability of the soils on the Project site, and existing site conditions. This section concludes with an evaluation of the impacts related to agricultural resources and recommendations for mitigating impacts as needed. Information in this section is derived primarily from the *California Important Farmlands Map* (California Department of Conservation, 2012), the *California Land Conservation (Williamson) Act Status Report* (California Department of Conservation, 2010), the *San Joaquin County Agricultural Report* (San Joaquin County Agricultural Commissioner, 2014), and the Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS, 2016). There were no comments received during the NOP scoping process related to this environmental topic.

There are no forest resources located on the Project site or in the City of Manteca, thus this CEQA topic is not relevant to the proposed Project and will not be addressed further in this EIR.

3.2.1 ENVIRONMENTAL SETTING

SAN JOAQUIN COUNTY AGRICULTURE

San Joaquin County occupies a central location in California's vast agricultural heartland, the San Joaquin Valley. The County's Agricultural Commissioner's most recent published Agricultural Report (2014) contains the following information about agriculture in the County.

Agricultural Value

San Joaquin County has a total land area of 1,391 square miles. The total acreage of crop land in 2014 was 784,800.

The gross value of agricultural production in San Joaquin County for 2014 is $3,234,705,000. This represents an increase of 8.66 percent from 2013. Table 3.2-1 lists the top eight commodities in San Joaquin County in 2014.

TABLE 3.2-1: SUMMARY COMPARISON OF CROP VALUES

PRODUCT TYPE	*2014 VALUE IN DOLLARS*
Field Crops	$345,345,000.00
Vegetable Crops	$312,804,000.00
Fruit and Nut Crops	$1,766,776,000.00
Nursery Products	$96,396,000.00
Livestock and Poultry	$122,882,000.00
Livestock and Poultry Products	$566,300,000.00
Seed Crops	$4,591,000.00
Apiary Products	$19,611,000.00

SOURCE: SAN JOAQUIN COUNTY AGRICULTURAL REPORT, 2014.

AGRICULTURAL CAPABILITY

The California Department of Conservation Farmland Mapping and Monitoring Program identifies lands that have agriculture value and maintains a statewide map of these lands called the

Important Farmlands Inventory (IFI). IFI classifies land based upon the productive capabilities of the land, rather than the mere presence of ideal soil conditions.

The suitability of soils for agricultural use is just one factor for determining the productive capabilities of land. Suitability is determined based on many characteristics, including fertility, slope, texture, drainage, depth, and salt content. A variety of classification systems have been devised by the state to categorize soil capabilities. The two most widely used systems are the Capability Classification System and the Storie Index. The Capability Classification System classifies soils from Class I to Class VIII based on their ability to support agriculture with Class I being the highest quality soil. The Storie Index considers other factors such as slope and texture to arrive at a rating. The IFI is in part based upon both of these two classification systems.

Soil Capability Classification System

The Soil Capability Classification System takes into consideration soil limitations, the risk of damage when soils are used, and the way in which soils respond to treatment. Capability classes range from Class I soils, which have few limitations for agriculture, to Class VIII soils that are unsuitable for agriculture. Generally, as the rating of the capability classification increases, yields and profits are more difficult to obtain. A general description of soil classifications, as defined by the Natural Resources Conservation Service (NRCS) is provided in Table 3.2-2 below.

TABLE 3.2-2: SOIL CAPABILITY CLASSIFICATION

CLASS	*DEFINITION*
I	Soils have slight limitations that restrict their use.
II	Soils have moderate limitations that restrict choice plants or that require moderate conservation practices.
III	Soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.
IV	Soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.
V	Soils are not likely to erode but have other limitations; impractical to remove that limits their use largely to pasture or range, woodland, or wildlife habitat.
VI	Soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife habitat.
VII	Soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife habitat.
VIII	Soils and landforms have limitations that preclude their use for commercial plans and restrict their use to recreation, wildlife habitat, water supply, or aesthetic purposes.

SOURCE: USDA SOIL CONSERVATION SERVICE.

Storie Index Rating System

The Storie Index Rating system ranks soil characteristics according to their suitability for agriculture from Grade 1 soils (80 to 100 rating) which have few or no limitations for agricultural production, to Grade 6 soils (less than 10) which are not suitable for agriculture. Under this system, soils deemed less than prime can function as prime soils when limitations such as poor drainage, slopes, or soil nutrient deficiencies are partially or entirely removed. The six grades, ranges in index rating, and definition of the grades, as defined by the NRCS, are provided below in Table 3.2-3.

TABLE 3.2-3: STORIE INDEX RATING SYSTEM

GRADE	*INDEX RATING*	*DEFINITION*
1	80 – 100	Few limitations that restrict their use for crops
2	60 – 80	Suitable for most crops, but have minor limitations that narrow the choice of crops and have a few special management needs
3	40 – 60	Suited to a few crops or to special crops and require special management
4	20 – 40	If used for crops, severely limited and require special management
5	10 – 20	Not suited for cultivated crops, but can be used for pasture and range
6	Less than 10	Soil and land types generally not suited to farming

SOURCE: USDA SOIL CONSERVATION SERVICE, SOIL SURVEY OF YOLO COUNTY, CALIFORNIA, 1972.

In addition to soil suitability, other factors for determining the agricultural value of land include whether soils are irrigated, the depth of soil, water-holding capacity, and physical and chemical characteristics. Areas considered to have the greatest agricultural potential are designated as Prime Farmland or Farmland of Statewide Importance.

Important Farmlands

The Farmland Mapping and Monitoring Program (FMMP) is a farmland classification system administered by the California Department of Conservation. Important farmland maps are based on the Land Inventory and Monitoring criteria, which classify a land's suitability for agricultural production based on both the physical and chemical characteristics of soils, and the actual land use. The system maps five categories of agricultural land, which include important farmlands (prime farmland, farmland of statewide importance, unique farmland, and farmland of local importance) and grazing land, as well as three categories of non-agricultural land, which include urban and built-up land, other land, and water area.

IMPORTANT FARMLANDS IN SAN JOAQUIN COUNTY

Data from the Department of Conservation indicates that approximately 762 acres of Prime Farmland in the County was developed for other uses between 2012 and 2014, resulting in an existing total of 382,877 acres of Prime Farmland (51 percent of agricultural land). The remaining agricultural land is comprised of Farmland of Statewide Importance (11 percent), Unique Farmland (10 percent), Farmland of Local Importance (10 percent), and Grazing Land (18 percent). The types and acreages of farmland in 2012 and 2014 are shown below in Table 3.2-4.

TABLE 3.2-4: SAN JOAQUIN COUNTY FARMLANDS SUMMARY AND CHANGE BY LAND USE CATEGORY

LAND USE CATEGORY	2012-2014 ACREAGE CHANGES							
	TOTAL ACREAGE INVENTORIED				ACRES LOST	ACRES GAINED	TOTAL ACREAGE CHANGED	NET ACREAGE CHANGED
	2012		2014		(-)	(+)		
	ACRES	PERCENT	ACRES	PERCENT				
Prime Farmland	382,115	42%	382,877	42%	1,421	2,183	3,604	762
Farmland of Statewide Importance	82,160	9%	82,271	9%	378	489	867	111
Unique Farmland	72,053	8%	76,415	8%	309	4,671	4,980	4,362
Farmland of Local Importance	76,405	8%	73,429	8%	4,821	1,845	6,666	-2,976
IMPORTANT FARMLAND SUBTOTAL	612,733	67%	614,992	67%	6,929	9,188	16,117	2,259
Grazing Land	135,896	15%	132,950	15%	2,996	50	3,046	-2,946
AGRICULTURAL LAND SUBTOTAL	748,629	82%	747,942	82%	9,925	9,238	19,163	-687
Urban and Built-up Land	93,278	10%	93,888	10%	118	728	846	610
Other Land	58,925	6%	59,002	6%	483	560	1,043	77
Water Area	11,764	1%	11,764	1%	0	0	0	0
TOTAL AREA INVENTORIED	912,596	100%	912,596	100%	10,526	10,526	21,052	0

SOURCE: CA DEPARTMENT OF CONSERVATION, DIVISION OF LAND RESOURCE PROTECTION TABLE A-30, 2014.

EXISTING SITE CONDITIONS

The current uses on the Project site are predominantly agricultural and undeveloped. The Project site has some existing improvements including an existing barn area with associated equipment, dirt and paved roadways, and irrigation ditches. The majority of the Project site is in active agricultural use. The barn structure is located in the central portion of the Project site. Additionally, Woodward Avenue traverses the center of the Project site from east to west, and McKinley Avenue traverses the northern portion of the Project site from north to south. The agricultural lands on the Project site are not under a Williamson Act contract or conservation easement.

Surrounding Land Uses

The Project site is surrounded by a variety of designated undeveloped and existing developed land uses. Uses immediately adjacent to the east, south, and west of the Project site include agricultural uses and residential uses, including ranchettes and large estates lots. Other existing uses east of the northerly portion of the Project site include a single family residential subdivision west of South Airport Way. Existing and future residential subdivisions also exist to the west of the Project site. Other nearby uses include rural residential uses north of the Project site and south of State Route (SR) 120.

The Project site is immediately southeast of the intersection of Bronzan Road and McKinley Avenue. The Project site is bounded on the north by an existing dirt roadway between Bronzan Road and Atherton Drive, on the east by South McKinley Avenue and an existing residential

subdivision, on the south by existing agricultural fields, and on the west by existing agricultural fields and the future Atherton Drive right-of-way. Figure 2.0-5 provides an aerial view of the site, and Figure 2.0-6 displays the current Manteca General Plan land use designations.

Project Site Farmland Characteristics

The State of California Department of Conservation Farmland Mapping and Monitoring Program and San Joaquin County GIS data were used to illustrate the farmland characteristics for the Project site. Farmlands on the Project site are identified in Figure 3.2-1. The farmland classifications for the site and surrounding area are described below.

PRIME FARMLAND

Prime Farmland is farmland with the best combination of physical and chemical features able to sustain long term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.

There is no Prime Farmland within the Project site. However, Prime Farmland exists to the west, southwest, and south of the Project site.

FARMLAND OF STATEWIDE IMPORTANCE

Farmland of Statewide Importance is farmland with characteristics similar to those of prime farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.

The majority of agricultural land, approximately 248.22 acres, is designated Farmland of Statewide Importance as shown on Figure 3.2-1. Farmland of Statewide Importance is also located in the general vicinity of the Project site to the east, south, and west.

UNIQUE FARMLAND

Unique farmland is farmland of lesser quality soils used for the production of the state's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Land must have been cropped at some time during the four years prior to the mapping date.

There is no Unique Farmland within the Project site, or in the immediately vicinity, that is designated Unique Farmland.

FARMLAND OF LOCAL IMPORTANCE

Farmland of Local Importance is land of importance to the local agricultural economy, as determined by each county's board of supervisors and a local advisory committee.

Approximately 10.07 acres of the Project site is designated Farmland of Local Importance as shown on Figure 3.2-1.

URBAN AND BUILT-UP LAND

Land occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately 6 structures to a 10-acre parcel. This land is used for residential, industrial, commercial, construction, institutional, public administration, railroad and other transportation yards, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, water control structures, and other developed purposes.

There is no Urban and Built-up Land within the Project site. Land adjacent east of the Project site are designated Urban and Built-up Land.

RURAL RESIDENTIAL LAND

Rural Residential Land has a building density of less than 1 structure per 1.5 acres, but with at least one structure per 10 acres. There is no Rural Residential Land within the Project site. Land adjacent north of the Project site is designated Rural Residential Land.

OTHER LAND

Other Land is not included in any other mapping category. Common examples include brush, timber, wetland, and riparian areas not suitable for livestock grazing; confined livestock, poultry or aquaculture facilities; strip mines, borrow pits; and water bodies smaller than forty acres. Vacant and nonagricultural land surrounded on all sides by urban development and greater than 40 acres is mapped as Other Land.

There is no Other Land within the Project site, or in the immediately vicinity, that is designated Other Land.

Soils and Farmland Characteristics

A Custom Soil Survey was completed for the Project site using the NRCS Web Soil Survey program. Table 3.2-5 identifies the soils found in the Plan Area. The NRCS Soils Map is provided on Figure 3.2-2.

TABLE 3.2-5: PROJECT SITE SOILS

UNIT SYMBOL	*NAME*	*ACRES IN AOI*	*PERCENT OF AOI*	*CAPABILITY CLASSIFICATION**
108	Arents, saline-sodic	81.20	31.4	III
142	Delhi loamy sand, MLRA 17	17.49	6.8	III
145	Dello loamy sand, drained	89.91	34.8	III
166	Grangeville fine sandy loam, partially drained	0.07	0.0	II
255	Tinnin loamy coarse sand	69.62	27.0	III

** DEPICTS IRRIGATED VS NON IRRIGATED CAPABILITY RATING*

SOURCE: NRCS CUSTOM WEB SOIL SURVEY, 2016; SAN JOAQUIN COUNTY SOIL SURVEY, 1992.

Arents, saline-sodic. The arents, saline-sodic soil is part of the Entisol soils series. Arents do not have diagnostic horizons because they have been deeply mixed by plowing, spading, or other methods of moving by humans.[1] Arents, saline-sodic, consists of deep, somewhat poorly drained soils. They formed in alluvial fans from mixed rock sources. Arents soils are on footslopes. Slopes are 0 to 2 percent. Arents, saline-sodic, have slow runoff. Arents are used mostly as cropland, urban land, or pasture. Some are used as wildlife habitat.

Delhi loamy sand. This series consists of very deep, somewhat excessively drained soils. They formed in wind modified material weathered from granitic rock sources. Delhi soils are on floodplains, alluvial fans and terraces. Slopes are 0 to 15 percent. They have negligible to slow runoff and rapid permeability. Common uses for this series include: growing grapes, peaches, truck crops, alfalfa and for home sites. Principal native plants are buckwheat and a few shrubs and trees. Typical vegetation is annual grasses and forbs.

Dello loamy sand. This series consists of very deep, very poorly drained soils. They formed in alluvium from granitic rock sources. Dello soils are in small depressions and have slopes ranging from 0 to 2 percent. They have slow runoff and rapid permeability. Common uses for this series include: irrigated field and row crops, and pasture. Typical vegetation is sedges, tules, saltgrass, and willows.

Grangeville fine sandy loam. This series consists of very deep, somewhat excessively drained soils. They formed in moderate coarse textured alluvium dominantly from granitic rock sources. Grangeville soils are on alluvial fans and floodplains and have slopes ranging from 0 to 2 percent. They have negligible to very low runoff and moderately rapid permeability. Common uses for this series include: growing alfalfa, grapes, cotton, truck crops and irrigated pasture. Typical vegetation is annual grasses and forbs with native alkali-tolerant plants and few scattered oak and cottonwood trees.

Tinnin loamy coarse sand. This series consists of well drained soils on low fan terraces and alluvial fans. These soils are very deep, and form in alluvium derived from granitic rock sources. Slopes range from 0 to 2 percent. This series is characterized as well draining, slow runoff, and rapid permeability. Common uses for this series are irrigated cropland growing primarily almonds, alfalfa, onions, tomatoes, small grains, grapes and pasture. Vegetation consists of red brome, filaree, soft chess, wildoats, ripgut brome and scattered valley oaks.

[1] United States Department of Agriculture, Natural Resources Conservation Service (NRCS). 2016. *Entisols Map*. Accessed July 18, 2016. Available at: <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/class/maps/?cid=nrcs142p2_053597>.

3.2.2 REGULATORY SETTING

FEDERAL

Farmland Protection Policy Act

The Farmland Protection Policy Act (FPPA) is intended to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses. It ensures that, to the extent practicable, federal programs are compatible with state and local units of government as well as private programs and policies to protect farmland. Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a federal agency or with assistance from a federal agency. For the purpose of the FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for crop production. In fact, the land can be forest land, pastureland, cropland, or other land but does not include water bodies or land developed for urban land uses (i.e., residential, commercial, or industrial uses).

The Natural Resource Conservation Service (NRCS) administers the Farmland Protection Program. NRCS uses a land evaluation and site assessment (LESA) system to establish a farmland conversion impact rating score on proposed sites of federally funded and assisted projects. This score is used as an indicator for the project sponsor to consider alternative sites if the potential adverse impacts on the farmland exceed the recommended allowable level. The assessment is completed on form AD-1006, Farmland Conversion Impact Rating. The sponsoring agency completes the site assessment portion of the AD-1006, which assesses non-soil related criteria such as the potential for impact on the local agricultural economy if the land is converted to non-farm use and compatibility with existing agricultural use.

The Project site and adjacent parcels will not be completed by a federal agency, or with assistance from a federal agency. Therefore, the Project will not be subject to the FPPA.

STATE

Williamson Act

The California Land Conservation Act of 1965, commonly known as the Williamson Act, was established based on numerous State legislative findings regarding the importance of agricultural lands in an urbanizing society. Policies emanating from those findings include those that discourage premature and unnecessary conversion of agricultural land to urban uses and discourage discontinuous urban development patterns, which unnecessarily increase the costs of community services to community residents.

The Williamson Act authorizes each County to establish an agricultural preserve. Land that is within the agricultural preserve is eligible to be placed under a contract between the property owner and County that would restrict the use of the land to agriculture in exchange for a tax assessment that is based on the yearly production yield. The contracts have a 10-year term that is

automatically renewed each year, unless the property owner requests a non-renewal or the contract is cancelled. If the contract is cancelled the property owner is assessed a fee of up to 12.5 percent of the property value.

The Project site is not under a Williamson Act contract, nor are any of the parcels that are located adjacent to the Project site under a current contract.

Farmland Security Zones

In 1998 the state legislature established the Farmland Security Zone (FSZ) program. FSZs are similar to Williamson Act contracts, in that the intention is to protect farmland from conversion. The main difference however, is that the FSZ must be designated as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance. The term of the contract is a minimum of 20 years. The property owners are offered an incentive of greater property tax reductions when compared to the Williamson Act contract tax incentives; the incentives were developed to encourage conservation of prime farmland through FSZs. The non-renewal and cancellation procedures are similar to those for Williamson Act contracts.

The Project site and the adjacent parcels are not within the FSZ program.

California Government Code Section 560643

This section of the Government Codes defines “Prime agricultural land” as follows:

- Prime agricultural land means an area of land, whether a single parcel or contiguous parcels, that has not been developed for a use other than an agricultural use and that meets any of the following qualifications:
    - Land that qualifies, if irrigated, for rating as class I or class II in the USDA Natural Resources Conservation Service land use capability classification, whether or not land is actually irrigated, provided that irrigation is feasible.
    - Land that qualifies for rating 80 through 100 Storie Index Rating.
    - Land that supports livestock used for the production of food and fiber and that has an annual carrying capacity equivalent to at least one animal unit per acre as defined by the United States Department of Agriculture in the National Range and Pasture Handbook, Revision 1, December 2003.
    - Land planted with fruit or nut-bearing trees, vines, bushes, or crops that have a nonbearing period of less than five years and that will re-turn during the commercial bearing period on an annual basis from the production of unprocessed agricultural plant production not less than four hundred dollars ($400) per acre.
    - Land that has returned from the production of unprocessed agricultural plant products an annual gross value of not less than four hundred dollars ($400) per acre for three of the previous five calendar years.

LOCAL

City of Manteca General Plan

The City of Manteca 2023 General Plan designates the Project site as Urban Reserve Business Industrial Park (UR-BIP Floor Area Ratio [FAR] 1.0), Business Industrial Park (BIP FAR 1.0), Commercial Mixed Use (CMU 15.1 to 25 dwelling units per acre [du/ac]), General Commercial (GC FAR 0.6), and Open Space (OS). The General Plan Resources Conservation Element provides a goal and policy framework for the preservation and conservation of agricultural resources. General Plan agricultural policies and implementation measures applicable to the Project are identified below:

POLICIES: AGRICULTURAL RESOURCES

- RC-P-19. The City shall support the continuation of agricultural uses on lands designated for urban use, until urban development is imminent.
- RC-P-20. The City shall provide an orderly and phased development pattern so that farmland is not subjected to premature development pressure.
- RC-P-21. In approving urban development near existing agricultural lands, the City shall take actions so that such development will not unnecessarily constrain agricultural practices or adversely affect the viability of nearby agricultural operations.
- RC-P-23. Protect designated agricultural lands, without placing an undue burden on agricultural landowners.
- RC-P-24. Provide buffers at the interface of urban development and farmland; in order to minimize conflicts between these uses.
- RC-P-25. The City shall ensure, in approving urban development near existing agricultural lands, that such development will not unnecessarily constrain agricultural practices or adversely affect the economic viability of nearby agricultural operations.
- RC-P-28. The City shall not extend water and sewer lines to premature urban development that would adversely affect agricultural operations.
- RC-P-30. The City of Manteca will participate in a county-wide program to mitigate the conversion of Prime Farmland and Farmlands of Statewide Importance to urban uses.

IMPLEMENTATION: AGRICULTURAL RESOURCES

- RC-I-30. Apply the following conditions of approval where urban development occurs next to farmland.
    - Require notifications in urban property deeds that agricultural operations are in the vicinity, in keeping with the City's right-to-farm ordinance.
    - Require adequate and secure fencing at the interface of urban and agricultural use.
    - Require phasing of new residential subdivisions; so as to include an interim buffer between residential and agricultural use.

City of Manteca Agricultural Mitigation Fee Program

Chapter 13.42 of the Municipal Code establishes the City's Agricultural Mitigation Fee Program, which authorizes the collection of development impact fees to offset costs associated with the loss of productive agricultural lands converted for urban uses within the City. Agricultural mitigation fees are required to be paid prior to issuance of any building permit. Fees are used to protect agricultural lands planned for agricultural use. Fees collected under Chapter 13.42 may be used as fair compensation for farmland conservation easements or farmland deed restrictions that conserve existing agricultural land.

City of Manteca Right to Farm Ordinance

Chapter 8.24 of the Municipal Code establishes the City's "Right to Farm" ordinance, which is intended to protect agricultural uses in the City. The ordinance establishes the City's policy to preserve, protect and encourage the use of viable agricultural land for the production of food and other agricultural products. Chapter 8.24 identifies that when nonagricultural land uses extend into or approach agricultural areas, conflicts may arise between such land uses and agricultural operations that often result in the involuntary curtailment or cessation of agricultural operations, and discourage investment in such operations.

Chapter 8.24 of the City's Municipal Code is intended to reduce the occurrence of such conflicts between nonagricultural and agricultural land uses within the City through requiring the transferor of any property in the City to provide a disclosure statement describing that the City permits agricultural operations, including those that utilize chemical fertilizers and pesticides. The disclosure statement notifies the purchaser that the property being purchased may be located close to agricultural lands and operations and that the purchaser may be subject to inconvenience or discomfort arising from the lawful and proper use of agricultural chemical and pesticides and from other agricultural activities, including without limitation, cultivation, plowing, spraying, irrigation, pruning, harvesting, burning of agricultural waste products, protection of crops and animals from depredation, and other activities which occasionally generate dust, smoke, noise and odor. In addition, prior to issuance of a city building permit for construction of a residential building, the owner of the property upon which the building is to be constructed is required to file a disclosure statement acknowledging the proximity of agricultural operations and the potential for inconvenience or nuisance associated with those uses.

San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP)

The SJMSCP provides comprehensive measures for compensation and avoidance of impacts on various biological resources, which includes ancillary benefits to agricultural resources. For instance, many of the habitat easements that are purchased or facilitated by the SJMSCP program are targeted for the protection of Swainson's hawk or other sensitive species habitat that are dependent on agricultural lands. The biological mitigation for these species through the SJMSCP includes the purchase of certain conservation easements for habitat purposes; however, the conservation easements are placed over agricultural land, such as alfalfa and row crops (not vines

or orchards). As such, SJMSCP fees paid to SJCOG as administrator of the SJMSCP will result in the preservation of agricultural lands in perpetuity.

3.2.3 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the proposed Project will have a significant impact on agricultural resources if it will:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Important Farmlands), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use;
- Conflict with existing zoning for agricultural use, or a Williamson Act contract;
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use.

IMPACTS AND MITIGATION MEASURES

Impact 3.2-1: The proposed Project has the potential to result in the conversion of Farmlands, including Prime Farmland and Farmland of Statewide Importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural uses. (Significant and Unavoidable)

Development of the proposed Project would result in the permanent conversion of 248.225 acres of Farmland of Statewide Importance, as shown on Figure 3.2-1, to nonagricultural use. The loss of Important Farmland as classified under the FMMP is considered a potentially significant environmental impact.

The City's agricultural mitigation fee program requires that future development pay the agricultural mitigation fee, currently $2,584.51 per acre, to mitigate the conversion of agricultural land to urban use. The City will use these funds to purchase conservation easements or deed restrictions on agricultural land to ensure that the land remains in agricultural use in perpetuity.

In addition to the City's agricultural mitigation fee program, the SJMSCP requires development to pay fees on a per-acre basis for impacts to agricultural lands that function as habitat for biological resources. SJCOG will then use these funds to purchase the conservation easements on agricultural and habitat lands in the Project vicinity. The compensation results in the purchase of conservation easements that are placed over agricultural land. As such, the Project fees paid to SJCOG as administrator of the SJMSCP will result in the preservation of agricultural lands in perpetuity.

The purchase of conservation easements and/or deed restrictions through the City agricultural mitigation fee program and the SJMSCP allows the landowners to retain ownership of the land and continue agricultural operations, and preserves such lands in perpetuity.

The General Plan EIR anticipated development of the Project site as part of the overall evaluation of the build out of the City. The General Plan EIR addressed the conversion and loss of agricultural land that would result from the build out of the General Plan (General Plan 2023 Draft EIR, pp. 4-13 through 4-15). The General Plan EIR determined that even with the implementation of mitigation measure AG-1.1, which identifies General Plan goals, policies, and implementation measures LU-P-41, LU-I-1 Goal RC-9, RC-P-18, and RC-P-19, and AG-1.2 and directs the major growth area to the Primary Urban Service boundary in a manner that avoids Prime Farmlands where feasible, the impact would be significant and unavoidable.

While the proposed Project will contribute fees toward the purchase of conservation easements on agricultural lands through the City's agricultural mitigation fee program and the SJMSCP (as required by Mitigation Measure 3.2-1), those fees and conservation easements would not result in the creation of new farmland to offset the loss that would occur with Project implementation. As such, the loss of Important Farmland would be a **significant and unavoidable** impact relative to this topic.

MITIGATION MEASURE(S)

Mitigation Measure 3.2-1: *Prior to the conversion of important farmland on the Project site, the Project applicant shall participate in the City's agricultural mitigation fee program and the SJMSCP by paying the established fees on a per-acre basis for the loss of important farmland. Fees paid toward the City's program shall be used to fund conservation easements on comparable or better agricultural lands to provide compensatory mitigation.*

Impact 3.2-2: The proposed Project has the potential to conflict with existing zoning for agricultural use, or Williamson Act Contracts. (Less than Significant)

The Project site is not under a Williamson Act Contract. Additionally, the Project site is not zoned for agricultural use. Conversion of the site from agricultural to urban uses has been anticipated by the City since the passage of the General Plan and associated EIR. Therefore, implementation of the proposed Project would have a **less than significant** impact relative to this topic and no mitigation is required.

Impact 3.2-3: The proposed Project has the potential to result in conflicts with adjacent agricultural lands or indirectly cause conversion of agricultural lands. (Less than Significant with Mitigation)

Neighboring agricultural land, including Prime Farmland and Farmland of Statewide Importance, are located to the east, south, west, and northwest of the Project site as shown on Figure 3.2-1. A variety of residential and commercial uses would be developed on the Project site with implementation of the proposed Project.

The City's General Plan anticipates that agricultural lands to the east, south, and west of the Project site would develop with urban uses. Existing agricultural lands that are located adjacent the Project site east, south, and west of the site may be impacted by the increased human presence on the Project site. The City's Right-to-Farm Ordinance reduces the potential for conflict between existing agricultural lands and adjacent uses. The notification procedures in the ordinance serves to inform landowners and developers of non-agricultural uses of what the expectations are in the area with regard to agricultural activities and to reduce complaints.

The General Plan 2023 EIR identifies that the location or nature of the General Plan could result in the conversion of farmland to non-agricultural use and identified Mitigation Measure AG-3.1, which included General Plan Policies RC-P-20, RC-P-23, RC-P-24, RC-P-25, and RC-P-27 and Implementation Measure RC-I-30. It is noted that some of these policies are re-numbered in the General Plan as adopted. The General Plan 2023 EIR determined that the impact would be less than significant if the mitigation was implemented to maintain agricultural use adjacent to non-agricultural uses (General Plan 2023 Draft EIR, pp. 4-18 and 4-19).

General Plan Policy RC-P-24 requires buffers at the interface of urban development and farmland in order to minimize conflicts between the uses. Policy RC-P-25 requires that the City, in approving urban development near existing agricultural lands, ensures that such development will not constrain nearby agricultural practices. Implementation measure RC-I-30 requires urban development next to farmland to provide notifications in keeping with the Right-to-Farm Ordinance and include adequate and secure fencing at the interface of urban and agricultural uses.

Most of the proposed development would be buffered from existing agricultural operations by existing or future residential development. The future Terra Ranch subdivision, which will be located adjacent east of the Cerri Subdivision, would buffer the eastern portion of the Project site from the agricultural area to the east. Additionally, the future Trails of Manteca Subdivision and Oakwood Trails Subdivision, which will be located adjacent west of the proposed Project, would buffer the western portion of the Project site from the agricultural area to the west. However, the southern portion of the Project site would not be buffered from nearby agricultural operations south of the Project site. As discussed previously, the City's Right to Farm Ordinance is intended to reduce the occurrence of such conflicts between nonagricultural and agricultural land uses within the City through requiring the transferor of any property in the City to provide a disclosure statement describing that the City permits agricultural operations, including those that utilize chemical fertilizers and pesticides. Compliance with the City's Right to Farm Ordinance would be ensured through Mitigation Measure 3.2-2. Implementation of Mitigation Measure 3.2-2 would ensure that the Project includes adequate measures to buffer Project uses from adjacent agricultural uses and would reduce adverse effects on neighboring agricultural uses. Consistent with the General Plan 2023 EIR, implementation of Mitigation Measure 3.2-2 would reduce potential impacts to **less than significant**.

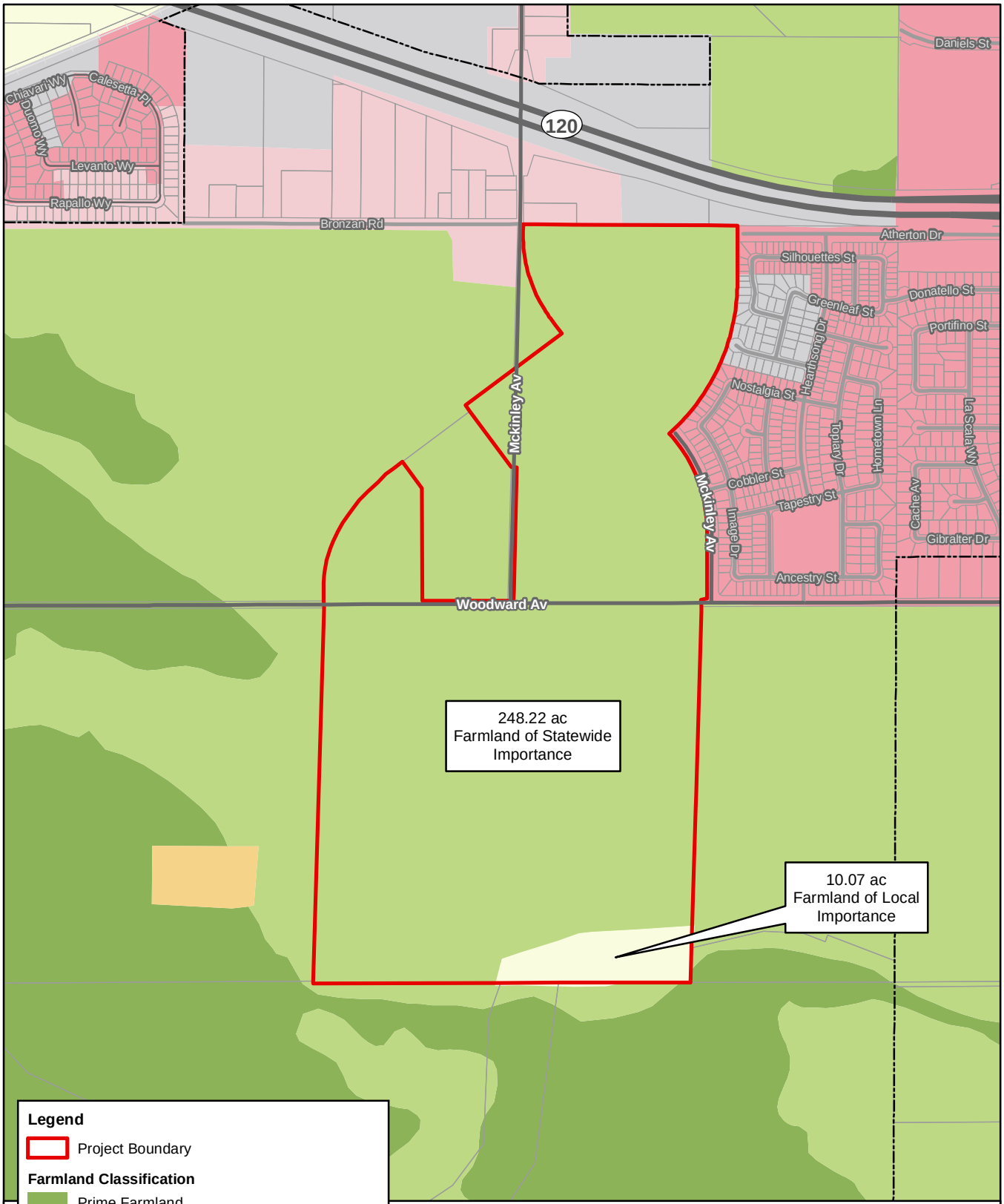
MITIGATION MEASURE(S)

Mitigation Measure 3.2-2: *Prior to approval of improvement plans for each phase of the Project, the Project applicant shall demonstrate that the Project site plans include adequate measures to*

buffer adjacent agricultural uses from urban uses on the Project site and to reduce adverse impacts to neighboring agricultural uses. Such measures shall include, but not be limited to:

- *The Project shall provide adequate and secure fencing at the interface of the Project site, or any individual phase of the Project, and adjacent to agricultural uses.*
- *The Project shall provide buffers, which may include parking areas, roadways and streets, drainage channels, and landscaped corridors, to buffer adjacent agricultural uses from the Project, including any individual phase of the Project, from proposed urban uses.*
- *The Project shall provide notifications to all operators of uses on the Project site that are adjacent or in the vicinity of existing agricultural land of the City's Right-to-Farm Ordinance.*

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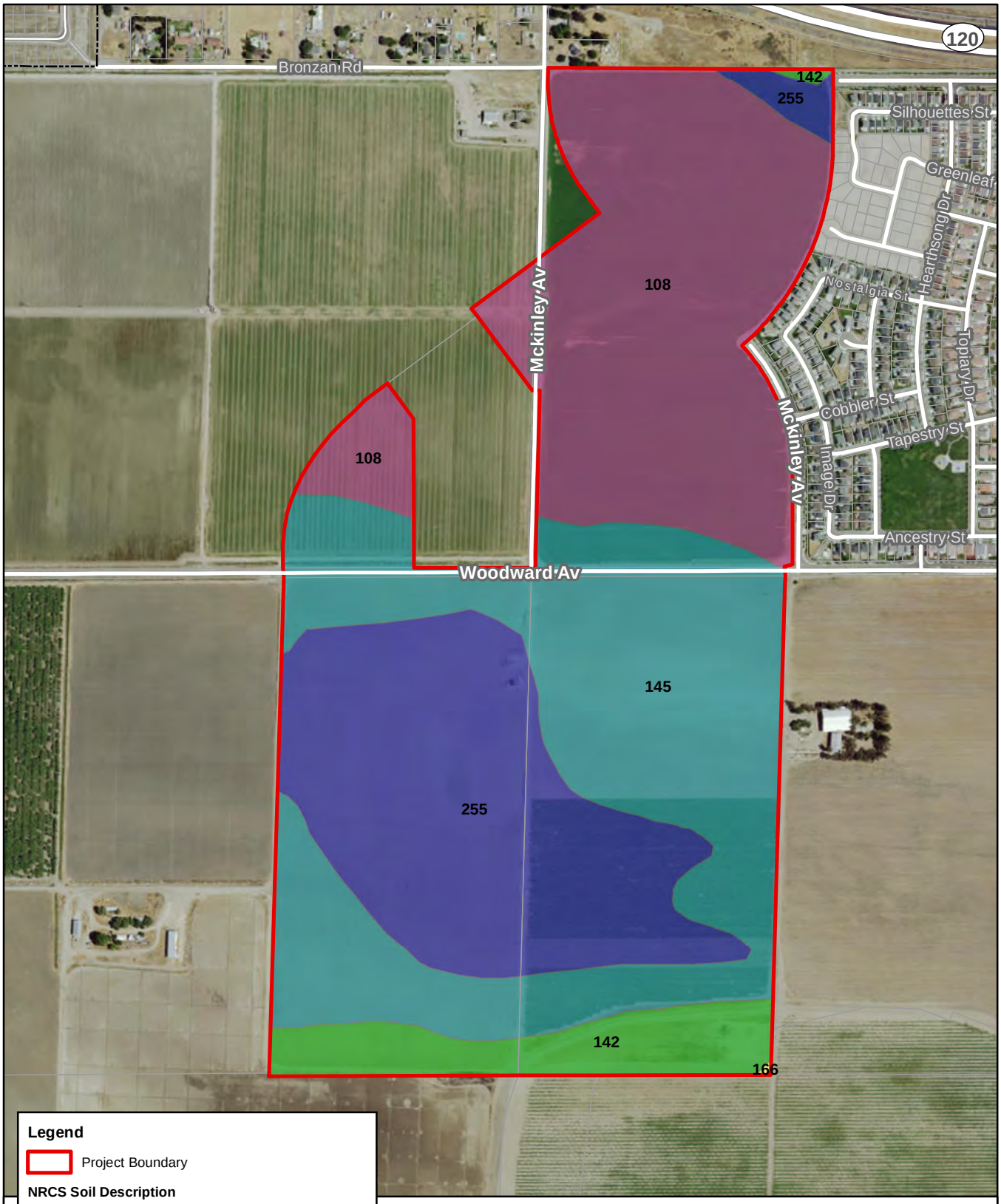
Sources: San Joaquin County GIS; Farmland Mapping and Monitoring Program, San Joaquin County 2014. Map date: July 17, 2016.

OAKWOOD LANDING

Figure 3.2-1: Project Site Farmland Classifications

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A Land Use Planning, Design, and Environmental Firm

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Sources: San Joaquin County GIS; NRCS Web Soil Survey, San Joaquin County, California (CA077), v9, 9-22-2015. Map date: July 18, 2016.

OAKWOOD LANDING

Figure 3.2-2: Project Site Soils

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A Land Use Planning, Design, and Environmental Firm

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This section describes the regional air quality, current attainment status of the air basin, local sensitive receptors, emission sources, and impacts that are likely to result from Project implementation. The analysis contained in this section is intended to be at a project-level, and covers impacts associated with the conversion of the entire site to urban uses. Following this discussion is an assessment of consistency of the proposed Project with applicable policies and local plans. The Greenhouse Gases and Climate Change analysis is located in a separate section of this document. This section is based in part on the following technical studies: *Air Quality and Land Use Handbook: A Community Health Perspective* (California Air Resources Board [CARB], 2007), *Guide for Assessing and Mitigation Air Quality Impacts* (San Joaquin Valley Air Pollution Control District [SJAVPCD], 2002), *Guidance for Assessing and Mitigating Air Quality Impacts - 2015* (SJAVPCD, 2015), CalEEMod *(v2016.3.1)* (CARB, 2016). There were no comments received during the NOP scoping process related to this environmental topic.

3.3.1 ENVIRONMENTAL SETTING

SAN JOAQUIN VALLEY AIR BASIN

The San Joaquin Valley Air Basin (SJVAB) consists of eight counties, stretching from Kern County in the south to San Joaquin County in the north. The SJVAB is bounded by the Sierra Nevada in the east, the Coast Ranges in the west, and the Tehachapi mountains in the south.

The surrounding topographic features restrict air movement through and out of the basin and, as a result, impede the dispersion of pollutants from the basin. Inversion layers are formed in the SJVAB throughout the year. (An inversion layer is created when a mass of warm dry air sits over cooler air near the ground, preventing vertical dispersion of pollutants from the air mass below). During the summer, the San Joaquin Valley experiences daytime temperature inversions at elevations from 2,000 to 2,500 feet above the valley floor. During the winter months, inversions occur from 500 to 1,000 feet above the valley floor (SJVAPCD, 2002).

The pollution potential of the San Joaquin Valley is very high. Surrounding elevated terrain in conjunction with temperature inversions frequently restrict lateral and vertical dilution of pollutants. Abundant sunshine and warm temperatures in summer are ideal conditions for the formation of photochemical oxidant, and the Valley is a frequent scene of photochemical pollution.

Climate

The SJVAB has an inland Mediterranean climate with warm, dry summers and cooler winters. The average daily maximum temperature in the Basin is 65 degrees Fahrenheit (°F), with temperature highs of 95 °F in July. Average daily minimum temperature is 48 °F, with temperature lows of 45 °F in January. Normal rainfall level is approximately 9 inches per year, and occurs mainly in the winter months from November to April. Thunderstorms occur on approximately three to four days in the spring, on average.

San Joaquin County has warm, dry days and relatively cool nights, with clear skies and limited rainfall. Winters are mild with light rains and frequent heavy fog from December to January.

In summer, high temperatures often exceed 100 degrees, with averages in the low 90's in the northern valley and the high 90's in the southern valley. Summer low temperatures average in the high 50's in the northern valley and the upper 60's in the southern valley. The northern end of the Valley (Manteca and Stockton area) receives approximately 20 inches of rain per year. The central portion of the Valley (Fresno area) receives approximately 10 inches of rain per year. The southern end of the Valley (Bakersfield area) receives less than 6 inches of rain per year.

Air Movement

Marine air comes into the basin from the Sacramento River–San Joaquin River Delta, although most air movement is restricted by the surrounding mountains. Winds from the Bay Area flow northeasterly into the Sacramento Valley and southward into San Joaquin County. This results in weak winds from the north and northeast, with an average speed of seven miles per hour.

Wind speed and direction determine the dispersion of air pollutants. During the summer, wind from the north flows south and southeasterly through the Valley, through the Tehachapi Pass and into the Southeast Desert Air Basin. Thus, emissions from the San Francisco Bay Area and the Broader Sacramento air basins are transported into San Joaquin County and the Valley. Emissions in the San Joaquin Valley are then transported to the Southeast Desert and Great Basin Valley Air Basins. In late fall and winter, cold air from the mountains flows into the Valley. This results in winds from the south that flow north and northwesterly. Some emissions from San Joaquin County are transported to the Broader Sacramento air basin during these times. But the winds are relatively light, limiting the dispersion of CO and other pollutants. Thus, high concentrations of CO remain in the Valley.

Seasonal Pollution Variations

Carbon monoxide, oxides of nitrogen, particulate matter, and lead particulate concentrations in the late fall and winter are highest when there is little interchange of air between the valley and the coast and when humidity is high following winter rains. This type of weather is associated with radiation fog, known as tule fog, when temperature inversions at ground level persist over the entire valley for several weeks and air movement is virtually absent.

Pollution potential in the San Joaquin County area is relatively high due to the combination of air pollutant emissions sources, transport of pollutants into the area and meteorological conditions that are conducive to high levels of air pollution. Elevated levels of particulate matter (primarily very small particulates or PM_{10}) and ground-level ozone are of most concern to regional air quality officials.

Local carbon monoxide "hot spots" are important to a lesser extent. Ground-level ozone, the principal component of smog, is not directly emitted into the atmosphere but is formed by the reaction of reactive organic gases (ROG) and nitrogen oxides (NOx) (known as ozone precursor pollutants) in the presence of strong sunlight. Ozone levels are highest in San Joaquin County during late spring through early fall, when weather conditions are conducive and emissions of the precursor pollutants are highest.

Surface-based inversions that form during late fall and winter nights cause localized air pollution problems (PM_{10} and carbon monoxide) near the emission sources because of poor dispersion conditions. Emission sources are primarily from automobiles. Conditions are exacerbated during drought-year winters.

Sunlight

The presence and intensity of sunlight are necessary prerequisites for the formation of photochemical smog. Under the influence of the ultraviolet radiation of sunlight, certain original or "primary" pollutants (mainly reactive hydrocarbons and oxides of nitrogen) react to form "secondary" pollutants (primarily oxidants). Since this process is time dependent, secondary pollutants can be formed many miles downwind from the emission sources. Because of the prevailing daytime winds and time delayed nature of photochemical smog, oxidant concentrations are highest in the inland areas of the San Joaquin Valley.

Temperature Inversions

A temperature inversion is a reversal in the normal decrease of temperature as altitude increases. In most parts of the country, air near ground level is warmer than the air above it. Semi-permanent systems of high barometric pressure fronts establish themselves over the basin, deflecting low-pressure systems that might otherwise bring cleansing rain and winds. The height of the base of the inversion is known as the "mixing height" and controls the volume of air available for the mixing and dispersion of air pollutants.

The interrelationship of air pollutants and climatic factors are most critical on days of greatly reduced atmospheric ventilation. On days such as these, air pollutants accumulate because of the simultaneous occurrence of three favorable factors: low inversions, low maximum mixing heights and low wind speeds. Although these conditions may occur throughout the year, the months of July, August and September generally account for more than 40 percent of these occurrences.

The potential for high contaminant levels varies seasonally for many contaminants. During late spring, summer and early fall, light winds, low mixing heights and sunshine combine to produce conditions favorable for the maximum production of oxidants, mainly ozone. When strong surface inversions are formed on winter nights, especially during the hours before sunrise, coupled with near-calm winds, carbon monoxide from automobile exhausts becomes highly concentrated. The highest yearly concentrations of carbon monoxide and oxides of nitrogen and measured during November, December and January.

CRITERIA POLLUTANTS

The United States Environmental Protection Agency (EPA) uses six "criteria pollutants" as indicators of air quality, and has established for each of them a maximum concentration above which adverse effects on human health may occur. These threshold concentrations are called National Ambient Air Quality Standards (NAAQS). Each criteria pollutant is described below.

Ozone (O_3) is a photochemical oxidant and the major component of smog. While O_3 in the upper atmosphere is beneficial to life by shielding the earth from harmful ultraviolet radiation from the sun, high concentrations of O_3 at ground level are a major health and environmental concern. O_3 is not emitted directly into the air but is formed through complex chemical reactions between precursor emissions of volatile organic compounds (VOC) and oxides of nitrogen (NO_x) in the presence of sunlight. These reactions are stimulated by sunlight and temperature so that peak O_3 levels occur typically during the warmer times of the year. Both VOCs and NO_x are emitted by transportation and industrial sources. VOCs are emitted from sources as diverse as autos, chemical manufacturing, dry cleaners, paint shops and other sources using solvents.

The reactivity of O_3 causes health problems because it damages lung tissue, reduces lung function and sensitizes the lungs to other irritants. Scientific evidence indicates that ambient levels of O_3 not only affect people with impaired respiratory systems, such as asthmatics, but healthy adults and children as well. Exposure to O_3 for several hours at relatively low concentrations has been found to significantly reduce lung function and induce respiratory inflammation in normal, healthy people during exercise. This decrease in lung function generally is accompanied by symptoms including chest pain, coughing, sneezing and pulmonary congestion.

Carbon monoxide (CO) is a colorless, odorless and poisonous gas produced by incomplete burning of carbon in fuels. When CO enters the bloodstream, it reduces the delivery of oxygen to the body's organs and tissues. Health threats are most serious for those who suffer from cardiovascular disease, particularly those with angina or peripheral vascular disease. Exposure to elevated CO levels can cause impairment of visual perception, manual dexterity, learning ability and performance of complex tasks.

Nitrogen dioxide (NO_2) is a brownish, highly reactive gas that is present in all urban atmospheres. NO_2 can irritate the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections. Nitrogen oxides are an important precursor both to O_3 and acid rain, and may affect both terrestrial and aquatic ecosystems. The major mechanism for the formation of NO_2 in the atmosphere is the oxidation of the primary air pollutant NO_x. NO_x plays a major role, together with VOCs, in the atmospheric reactions that produce O_3. NO_x forms when fuel is burned at high temperatures. The two major emission sources are transportation and stationary fuel combustion sources such as electric utility and industrial boilers.

Sulfur dioxide (SO_2) affects breathing and may aggravate existing respiratory and cardiovascular disease in high doses. Sensitive populations include asthmatics, individuals with bronchitis or emphysema, children and the elderly. SO_2 is also a primary contributor to acid deposition, or acid rain, which causes acidification of lakes and streams and can damage trees, crops, historic buildings and statues. In addition, sulfur compounds in the air contribute to visibility impairment in large parts of the country. This is especially noticeable in national parks. Ambient SO_2 results largely from stationary sources such as coal and oil combustion, steel mills, refineries, pulp and paper mills and from nonferrous smelters.

Particulate matter (PM) includes dust, dirt, soot, smoke and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, construction activity, fires and natural

windblown dust. Particles formed in the atmosphere by condensation or the transformation of emitted gases such as SO_2 and VOCs are also considered particulate matter.

Based on studies of human populations exposed to high concentrations of particles (sometimes in the presence of SO_2) and laboratory studies of animals and humans, there are major effects of concern for human health. These include effects on breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular disease, alterations in the body's defense systems against foreign materials, damage to lung tissue, carcinogenesis and premature death.

Respirable particulate matter (PM_{10}) consists of small particles, less than 10 microns in diameter, of dust, smoke, or droplets of liquid which penetrate the human respiratory system and cause irritation by themselves, or in combination with other gases. Particulate matter is caused primarily by dust from grading and excavation activities, from agricultural uses (as created by soil preparation activities, fertilizer and pesticide spraying, weed burning and animal husbandry), and from motor vehicles, particularly diesel-powered vehicles. PM_{10} causes a greater health risk than larger particles, since these fine particles can more easily penetrate the defenses of the human respiratory system.

Fine particulate matter ($PM_{2.5}$) consists of small particles, which are less than 2.5 microns in size. Similar to PM_{10}, these particles are primarily the result of combustion in motor vehicles, particularly diesel engines, as well as from industrial sources and residential/agricultural activities such as burning. It is also formed through the reaction of other pollutants. As with PM_{10}, these particulates can increase the chance of respiratory disease, and cause lung damage and cancer. In 1997, the EPA created new Federal air quality standards for $PM_{2.5}$.

The major subgroups of the population that appear to be most sensitive to the effects of particulate matter include individuals with chronic obstructive pulmonary or cardiovascular disease or influenza, asthmatics, the elderly and children. Particulate matter also soils and damages materials, and is a major cause of visibility impairment.

Lead (Pb) exposure can occur through multiple pathways, including inhalation of air and ingestion of Pb in food, water, soil or dust. Excessive Pb exposure can cause seizures, mental retardation and/or behavioral disorders. Low doses of Pb can lead to central nervous system damage. Recent studies have also shown that Pb may be a factor in high blood pressure and subsequent heart disease.

ODORS

Typically, odors are regarded as an annoyance rather than a health hazard. However, manifestations of a person’s reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

With respect to odors, the human nose is the sole sensing device. The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell minute quantities of specific substances; others may not have the same sensitivity

but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; in fact, an odor that is offensive to one person (e.g., from a fast-food restaurant) may be perfectly acceptable to another.

It is also important to note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity.

Quality and intensity are two properties present in any odor. The quality of an odor indicates the nature of the smell experience. For instance, if a person describes an odor as flowery or sweet, then the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word "strong" to describe the intensity of an odor. Odor intensity depends on the odorant concentration in the air.

When an odorous sample is progressively diluted, the odorant concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult. At some point during dilution, the concentration of the odorant reaches a detection threshold. An odorant concentration below the detection threshold means that the concentration in the air is not detectable by the average human.

SENSITIVE RECEPTORS

A sensitive receptor is a location where human populations, especially children, seniors, and sick persons, are present and where there is a reasonable expectation of continuous human exposure to pollutants. Examples of sensitive receptors include residences, hospitals and schools.

AMBIENT AIR QUALITY

Both the U.S. Environmental Protection Agency (U.S. EPA) and the California Air Resources Board (CARB) have established ambient air quality standards for common pollutants. These ambient air quality standards represent safe levels of contaminants that avoid specific adverse health effects associated with each pollutant.

The federal and California state ambient air quality standards are summarized in Table 3.3-1 for important pollutants. The federal and state ambient standards were developed independently, although both processes attempted to avoid health-related effects. As a result, the federal and state standards differ in some cases. In general, the California state standards are more stringent. This is particularly true for ozone and particulate matter between 2.5 and 10 microns in diameter (PM_{10}).

TABLE 3.3-1: FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS

POLLUTANT	*AVERAGING TIME*	*FEDERAL PRIMARY STANDARD*	*STATE STANDARD*
Ozone	1-Hour 8-Hour	-- 0.075 ppm	0.09 ppm 0.070 ppm
Carbon Monoxide	8-Hour 1-Hour	9.0 ppm 35.0 ppm	9.0 ppm 20.0 ppm
Nitrogen Dioxide	Annual 1-Hour	0.053 ppm 0.100 ppm	0.03 ppm 0.18 ppm
Sulfur Dioxide	Annual 24-Hour 1-Hour	0.03 ppm 0.14 ppm 75 ppb	-- 0.04 ppm 0.25 ppm
PM_{10}	Annual 24-Hour	-- 150 µg / m^3	20 µg / m^3 50 µg / m^3
$PM_{2.5}$	Annual 24-Hour	12 µg / m^3 35 µg / m^3	12 µg / m^3 --
Lead	30-Day Average 3-Month Average	-- 0.15 µg / m^3	1.5 µg / m^3 --

NOTES: PPM = PARTS PER MILLION, µG/M^3 = MICROGRAMS PER CUBIC METER.

SOURCE: CALIFORNIA AIR RESOURCES BOARD, 2013.

The U.S. Environmental Protection Agency established new national air quality standards for ground-level ozone and for fine particulate matter in 1997. The 1-hour ozone standard was phased out and replaced by an 8-hour standard of 0.075 PPM. Implementation of the 8-hour standard was delayed by litigation, but was determined to be valid and enforceable by the U.S. Supreme Court in a decision issued in February of 2001.

In 1997, new national standards for fine particulate matter diameter 2.5 microns or less ($PM_{2.5}$) were adopted for 24-hour and annual averaging periods. The current PM_{10} standards were to be retained, but the method and form for determining compliance with the standards were revised.

The State of California regularly reviews scientific literature regarding the health effects and exposure to PM and other pollutants. On May 3, 2002, CARB staff recommended lowering the level of the annual standard for PM_{10} and establishing a new annual standard for $PM_{2.5}$. The new standards became effective on July 5, 2003, with another revision on November 29, 2005.

In addition to the criteria pollutants discussed above, Toxic Air Contaminants (TACs) are another group of pollutants of concern. TACs are injurious in small quantities and are regulated despite the absence of criteria documents. The identification, regulation and monitoring of TACs is relatively recent compared to that for criteria pollutants. Unlike criteria pollutants, TACs are regulated on the basis of risk rather than specification of safe levels of contamination.

Existing air quality concerns within San Joaquin County and the entire SJVAB are related to increases of regional criteria air pollutants (e.g., ozone and particulate matter), exposure to toxic air contaminants, odors, and increases in greenhouse gas emissions contributing to climate change. The primary source of ozone (smog) pollution is motor vehicles which account for 70 percent of the ozone in the region. Particulate matter is caused by dust, primarily dust generated from construction and grading activities, and smoke which is emitted from fireplaces, wood-burning stoves, and agricultural burning.

Attainment Status

In accordance with the California Clean Air Act (CCAA), the CARB is required to designate areas of the state as attainment, nonattainment, or unclassified with respect to applicable standards. An "attainment" designation for an area signifies that pollutant concentrations did not violate the applicable standard in that area. A "nonattainment" designation indicates that a pollutant concentration violated the applicable standard at least once, excluding those occasions when a violation was caused by an exceptional event, as defined in the criteria.

Depending on the frequency and severity of pollutants exceeding applicable standards, the nonattainment designation can be further classified as serious nonattainment, severe nonattainment, or extreme nonattainment, with extreme nonattainment being the most severe of the classifications. An "unclassified" designation signifies that the data do not support either an attainment or nonattainment status. The CCAA divides districts into moderate, serious, and severe air pollution categories, with increasingly stringent control requirements mandated for each category.

The U.S. EPA designates areas for ozone (O3), carbon monoxide (CO), and nitrogen dioxide (NO2) as "does not meet the primary standards," "cannot be classified," or "better than national standards." For sulfur dioxide (SO2), areas are designated as "does not meet the primary standards," "does not meet the secondary standards," "cannot be classified," or "better than national standards." However, the CARB terminology of attainment, nonattainment, and unclassified is more frequently used.

San Joaquin County has a state designation of Nonattainment for Ozone, PM_{10}, and $PM_{2.5}$ and is either Unclassified or Attainment for all other criteria pollutants. The County has a national designation of Nonattainment for ozone and $PM_{2.5}$. The County is designated either attainment or unclassified for the remaining national standards. Table 3.3-2 presents the state and nation attainment status for San Joaquin County.

TABLE 3.3-2: STATE AND NATIONAL ATTAINMENT STATUS

CRITERIA POLLUTANTS	*STATE DESIGNATIONS*	*NATIONAL DESIGNATIONS*
Ozone	Nonattainment	Nonattainment
PM_{10}	Nonattainment	Attainment
$PM_{2.5}$	Nonattainment	Nonattainment
Carbon Monoxide	Attainment	Unclassified/Attainment
Nitrogen Dioxide	Attainment	Unclassified/Attainment
Sulfur Dioxide	Attainment	Unclassified
Sulfates	Attainment	--
Lead	Attainment	--
Hydrogen Sulfide	Unclassified	--
Visibility Reducing Particles	Unclassified	--

SOURCE: CALIFORNIA AIR RESOURCES BOARD, 2013.

San Joaquin Valley Air Basin Monitoring

The SJVAB consists of eight counties, from San Joaquin County in the north to Kern County in the south. SJVAPCD and CARB maintain numerous air quality monitoring sites throughout each County in the Air Basin to measure ozone, $PM_{2.5}$, and PM_{10}. It is important to note that the federal ozone 1-hour standard was revoked by the EPA and is no longer applicable for federal standards. Data obtained from the monitoring sites throughout the SJVAB between 2013 and 2015 is summarized in Tables 3.3-3 through 3.3-5.

TABLE 3.3-3 SJVAB AMBIENT AIR QUALITY MONITORING DATA SUMMARY - OZONE

YEAR	DAYS > STANDARD				1-HOUR OBSERVATIONS			8-HOUR AVERAGES				YEAR COVERAGE	
	STATE		NATIONAL			STATE	NAT'L	STATE		NATIONAL			
	1-HR	8-HR	1-HR	'08 8-HR	MAX.	D.V.[1]	D.V.[2]	MAX.	D.V.[1]	MAX.	'08 D.V.[2]	MIN	MAX
2015	45	99	1	80	0.135	0.12	0.116	0.110	0.104	0.110	0.093	61	99
2014	48	128	1	86	0.128	0.12	0.118	0.105	0.108	0.104	0.095	83	100
2013	41	112	0	89	0.123	0.14	0.127	0.106	0.116	0.106	0.094	53	100

NOTES: ALL CONCENTRATIONS EXPRESSED IN PARTS PER MILLION. THE NATIONAL 1-HOUR OZONE STANDARD WAS REVOKED IN JUNE 2005 AND IS NO LONGER IN EFFECT. STATISTICS RELATED TO THE REVOKED STANDARD ARE SHOWN IN ITALICS. D.V. [1] = STATE DESIGNATION VALUE. D.V. [2]= NATIONAL DESIGN VALUE.

SOURCE: CALIFORNIA AIR RESOURCES BOARD (AEROMETRIC DATA ANALYSIS AND MANAGEMENT SYSTEM OR IADAM) AIR POLLUTION SUMMARIES.

TABLE 3.3-4 SJVAB AMBIENT AIR QUALITY MONITORING DATA SUMMARY - PM 2.5

YEAR	EST. DAYS > NAT'L '06 STD.	ANNUAL AVERAGE		NAT'L ANN. STD. D.V.[1]	STATE ANNUAL D.V.[2]	NAT'L '06 STD. 98TH PERCENTILE	NAT'L '06 24-HR STD. D.V.[1]	HIGH 24-HOUR AVERAGE		YEAR COVERAGE	
		NAT'L	STATE					NAT'L	STATE	MIN.	MAX.
2015	38.0	17.9	17.9	20.8	19	99.2	77	107.8	111.9	16	100
2014	40.4	21.6	18.6	19.7	19	107.2	71	107.2	107.2	32	100
2013	50.4	22.8	18.7	18.1	19	96.7	65	167.3	167.3	87	100

NOTES: ALL CONCENTRATIONS EXPRESSED IN PARTS PER MILLION. STATE AND NATIONAL STATISTICS MAY DIFFER FOR THE FOLLOWING REASONS: STATE STATISTICS ARE BASED ON CALIFORNIA APPROVED SAMPLERS, WHEREAS NATIONAL STATISTICS ARE BASED ON SAMPLERS USING FEDERAL REFERENCE OR EQUIVALENT METHODS. STATE AND NATIONAL STATISTICS MAY THEREFORE BE BASED ON DIFFERENT SAMPLERS. STATE CRITERIA FOR ENSURING THAT DATA ARE SUFFICIENTLY COMPLETE FOR CALCULATING VALID ANNUAL AVERAGES ARE MORE STRINGENT THAN THE NATIONAL CRITERIA. D.V. [1] = STATE DESIGNATION VALUE. D.V. [2]= NATIONAL DESIGN VALUE

SOURCE: CALIFORNIA AIR RESOURCES BOARD (AEROMETRIC DATA ANALYSIS AND MANAGEMENT SYSTEM OR IADAM) AIR POLLUTION SUMMARIES.

TABLE 3.3-5: SJVAB AMBIENT AIR QUALITY MONITORING DATA SUMMARY - PM 10

YEAR	EST. DAYS > STD.		ANNUAL AVERAGE		3-YEAR AVERAGE		HIGH 24-HR AVERAGE		YEAR COVERAGE
	NAT'L	STATE	NAT'L	STATE	NAT'L	STATE	NAT'L	STATE	
2015	*	*	66.3	*	*	48	124.6	104.4	77
2014	8.4	138.8	57.9	47.5	45	48	430.1	419.5	100
2013	3.8	122.3	65.2	45.6	44	46	224.2	183.6	100

*NOTES: THE NATIONAL ANNUAL AVERAGE PM10 STANDARD WAS REVOKED IN DECEMBER 2006 AND IS NO LONGER IN EFFECT. AN EXCEEDANCE IS NOT NECESSARILY A VIOLATION. STATISTICS MAY INCLUDE DATA THAT ARE RELATED TO AN EXCEPTIONAL EVENT. STATE AND NATIONAL STATISTICS MAY DIFFER FOR THE FOLLOWING REASONS: STATE STATISTICS ARE BASED ON CALIFORNIA APPROVED SAMPLERS, WHEREAS NATIONAL STATISTICS ARE BASED ON SAMPLERS USING FEDERAL REFERENCE OR EQUIVALENT METHODS. STATE AND NATIONAL STATISTICS MAY THEREFORE BE BASED ON DIFFERENT SAMPLERS. NATIONAL STATISTICS ARE BASED ON STANDARD CONDITIONS. STATE CRITERIA FOR ENSURING THAT DATA ARE SUFFICIENTLY COMPLETE FOR CALCULATING VALID ANNUAL AVERAGES ARE MORE STRINGENT THAN THE NATIONAL CRITERIA. * = THERE WAS INSUFFICIENT (OR NO) DATA AVAILABLE TO DETERMINE THE VALUE.*

SOURCE: CALIFORNIA AIR RESOURCES BOARD (AEROMETRIC DATA ANALYSIS AND MANAGEMENT SYSTEM OR IADAM) AIR POLLUTION SUMMARIES.

San Joaquin County Air Quality Monitoring

SJVAPCD and CARB maintain two air quality monitoring sites in San Joaquin County that collect data for ozone, PM_{10}, and $PM_{2.5}$. These include the Stockton - Hazelton Street and Tracy – Airport monitoring sites. The federal ozone 1-hour standard was revoked by the EPA in 2005, but subsequent litigation reinstated portions of implementation requirements under the revoked standard. As a result, the SJVAPCD adopted the 2013 Plan for the Revoked 1-Hour Ozone Standard in September 2013 to address the reinstated requirements for this standard. The data and analysis contained in this Draft EIR does not conflict with the 2013 Plan. Data obtained from the monitoring sites between 2013 and 2015 is shown in Tables 3.3-6 and 3.3-7.

TABLE 3.3-6: AMBIENT AIR QUALITY MONITORING DATA (STOCKTON – HAZELTON STREET)

POLLUTANT	CAL. PRIMARY STANDARD	FED. PRIMARY STANDARD	YEAR	MAXIMUM CONCENTRATION	DAYS EXCEEDED STATE/FED STANDARD
Ozone (O_3) (1-hour)	0.09 ppm for 1 hour	NA	2015 2014 2013	0.094 0.090 0.080	0 / (N/A) 0 / (N/A) 0 / (N/A)
Ozone (O_3) (8-hour)	0.07 ppm for 8 hour	0.075 ppm for 8 hour	2015 2014 2013	0.079 0.078 0.067	3 / 1 5 / 1 0 / 0
Particulate Matter (PM_{10})	50 ug/m^3 for 24 hours	150 ug/m^3 for 24 hours	2015 2014 2013	55.3 94.0 95.5	* / * 18.0 / 0 58.2 / 0
Fine Particulate Matter ($PM_{2.5}$)	No 24 hour State Standard	35 ug/m^3 for 24 hours	2015 2014 2013	58.8 56.8 66.5	(N/A) / * (N/A) / 16.0 (N/A) / 27.6

SOURCE: CALIFORNIA AIR RESOURCES BOARD (AEROMETRIC DATA ANALYSIS AND MANAGEMENT SYSTEM OR IADAM) AIR POLLUTION SUMMARIES.

TABLE 3.3-7: AMBIENT AIR QUALITY MONITORING DATA (TRACY – AIRPORT)

POLLUTANT	CAL. PRIMARY STANDARD	FED. PRIMARY STANDARD	YEAR	MAXIMUM CONCENTRATION	DAYS EXCEEDED STATE/FED STANDARD
Ozone (O_3) (1-hour)	0.09 ppm for 1 hour	N/A	2015 2014 2013	0.107 0.097 0.096	4 / (N/A) 1 / (N/A) 1 / (N/A)
Ozone (O_3) (8-hour)	0.07 ppm for 8 hour	0.075 ppm for 8 hour	2015 2014 2013	0.091 0.098 0.098	21 / 5 17 / 8 5 / 2
Particulate Matter (PM_{10})	50 ug/m^3 for 24 hours	150 ug/m^3 for 24 hours	2015 2014 2013	58.3 67.7 73.2	* / * * / 0.0 * / 0.0
Fine Particulate Matter ($PM_{2.5}$)	No 24 hour State Standard	35 ug/m^3 for 24 hours	2015 2014 2013	39.0 36.8 56.3	* / * * / * * / *

SOURCE: CALIFORNIA AIR RESOURCES BOARD (AEROMETRIC DATA ANALYSIS AND MANAGEMENT SYSTEM OR IADAM) AIR POLLUTION SUMMARIES.

3.3.2 REGULATORY SETTING

FEDERAL

Clean Air Act

The Federal Clean Air Act (FCAA) was first signed into law in 1970. In 1977, and again in 1990, the law was substantially amended. The FCAA is the foundation for a national air pollution control effort, and it is composed of the following basic elements: NAAQS for criteria air pollutants, hazardous air pollutant standards, state attainment plans, motor vehicle emissions standards, stationary source emissions standards and permits, acid rain control measures, stratospheric ozone protection, and enforcement provisions.

The EPA is responsible for administering the FCAA. The FCAA requires the EPA to set NAAQS for several problem air pollutants based on human health and welfare criteria. Two types of NAAQS were established: primary standards, which protect public health, and secondary standards, which protect the public welfare from non-health-related adverse effects such as visibility reduction.

The law recognizes the importance for each state to locally carry out the requirements of the FCAA, as special consideration of local industries, geography, housing patterns, etc. are needed to have full comprehension of the local pollution control problems. As a result, the EPA requires each state to develop a State Implementation Plan (SIP) that explains how each state will implement the FCAA within their jurisdiction. A SIP is a collection of rules and regulations that a particular state will implement to control air quality within their jurisdiction. CARB is the state agency that is responsible for preparing the California SIP.

Transportation Control Measures

One particular aspect of the SIP development process is the consideration of potential control measures as a part of making progress towards clean air goals. While most SIP control measures

are aimed at reducing emissions from stationary sources, some are typically also created to address mobile or transportation sources. These are known as transportation control measures (TCMs). TCM strategies are designed to reduce vehicle miles traveled and trips, or vehicle idling and associated air pollution. These goals are achieved by developing attractive and convenient alternatives to single-occupant vehicle use. Examples of TCMs include ridesharing programs, transportation infrastructure improvements such as adding bicycle and carpool lanes, and expansion of public transit.

STATE

CARB Mobile-Source Regulation

The State of California is responsible for controlling emissions from the operation of motor vehicles in the state. Rather than mandating the use of specific technology or the reliance on a specific fuel, the CARB's motor vehicle standards specify the allowable grams of pollution per mile driven. In other words, the regulations focus on the reductions needed rather than on the manner in which they are achieved. Towards this end, the CARB has adopted regulations which required auto manufacturers to phase in less polluting vehicles.

California Clean Air Act

The California Clean Air Act (CCAA) was first signed into law in 1988. The CCAA provides a comprehensive framework for air quality planning and regulation, and spells out, in statute, the state's air quality goals, planning and regulatory strategies, and performance. CARB is the agency responsible for administering the CCAA. CARB established ambient air quality standards pursuant to the California Health and Safety Code (CH&SC) [§39606(b)], which are similar to the federal standards. The San Joaquin Valley Air Pollution Control District is one of 35 air quality management districts that have prepared air quality management plans to accomplish a five percent annual reduction in emissions documenting progress toward the state ambient air quality standards.

Air Quality Standards

NAAQS are determined by the EPA. The standards include both primary and secondary ambient air quality standards. Primary standards are established with a safety margin. Secondary standards are more stringent than primary standards and are intended to protect public health and welfare. States have the ability to set standards that are more stringent than the federal standards. As such, California established more stringent ambient air quality standards.

Federal and state ambient air quality standards have been established for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, PM_{10}, and lead. In addition, California has created standards for pollutants that are not covered by federal standards. The state and federal primary standards for major pollutants are shown in Table 3.3-1.

Tanner Air Toxics Act

California regulates TACs primarily through the Tanner Air Toxics Act (AB 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588). The Tanner Act sets forth a formal

procedure for ARB to designate substances as TACs. This includes research, public participation, and scientific peer review before ARB can designate a substance as a TAC. To date, ARB has identified more than 21 TACs and has adopted EPA's list of HAPs as TACs. Most recently, diesel PM was added to the ARB list of TACs. Once a TAC is identified, ARB then adopts an Airborne Toxics Control Measure (ATCM) for sources that emit that particular TAC. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If there is no safe threshold, the measure must incorporate BACT to minimize emissions.

The AB 2588 requires that existing facilities that emit toxic substances above a specified level prepare a toxic-emission inventory, prepare a risk assessment if emissions are significant, notify the public of significant risk levels, and prepare and implement risk reduction measures. ARB has adopted diesel exhaust control measures and more stringent emission standards for various on-road mobile sources of emissions, including transit buses and off-road diesel equipment (e.g., tractors, generators). In February 2000, ARB adopted a new public-transit bus-fleet rule and emission standards for new urban buses. These rules and standards provide for (1) more stringent emission standards for some new urban bus engines, beginning with 2002 model year engines; (2) zero-emission bus demonstration and purchase requirements applicable to transit agencies; and (3) reporting requirements under which transit agencies must demonstrate compliance with the urban transit bus fleet rule. Upcoming milestones include the low-sulfur diesel-fuel requirement, and tighter emission standards for heavy-duty diesel trucks (2007) and off-road diesel equipment (2011) nationwide.

LOCAL

San Joaquin Valley Air Pollution Control District

The San Joaquin Valley Air Pollution Control District (SJVAPCD) is the local agency with primary responsibility for compliance with both the federal and state standards and for ensuring that air quality conditions are maintained. They do this through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The eight counties that comprise the SJVAPCD are divided into three regions. These include:

- Northern Region: Merced, San Joaquin, and Stanislaus Counties
- Central Region: Madera, Fresno, and Kings Counties
- Southern Region: Tulare and Valley portion of Kern Counties

Activities of the SJVAPCD include the preparation of plans for the attainment of ambient air quality standards, adoption and enforcement of rules and regulations concerning sources of air pollution, issuance of permits for stationary sources of air pollution, inspection of stationary sources of air pollution and response to citizen complaints, monitoring of ambient air quality and meteorological conditions, and implementation of programs and regulations required by the FCAA and CCAA.

The SJVAPCD has prepared the *2007 Ozone Plan* to achieve Federal and State standards for improved air quality in the SJVAB regarding ozone. The *2007 Ozone Plan* provides a comprehensive list of regulatory and incentive-based measures to reduce emissions of ozone and particulate

matter precursors throughout the SJVAB. The 2007 Ozone Plan calls for major advancements in pollution control technologies for mobile and stationary sources of air pollution. The *2007 Ozone Plan* calls for a 75-percent reduction in ozone-forming oxides of nitrogen emissions.

The SJVAPCD has also prepared the *2007 PM10 Maintenance Plan and Request for Redesignation* (2007 PM10 Plan). On April 24, 2006, the SJVAPCD submitted a Request for Determination of PM10 Attainment for the Basin to CARB. CARB concurred with the request and submitted the request to the EPA on May 8, 2006. On October 30, 2006, the EPA issued a Final Rule determining that the Basin had attained the NAAQS for PM10. However, the EPA noted that the Final Rule did not constitute a redesignation to attainment until all of the FCAA requirements under Section 107(d)(3) were met.

The SJVAPCD has prepared the *2008 PM.2.5 Plan* to achieve Federal and State standards for improved air quality in the San Joaquin Valley Air Basin. The *2008 PM.2.5 Plan* provides a comprehensive list of regulatory and incentive based measures to reduce PM2.5.

In addition to the *2007 Ozone Plan, the 2008 PM2.5 Plan,* and the *2007 PM10 Plan*, the SJVAPCD prepared the *Guide for Assessing and Mitigating Air Quality Impacts* (GAMAQI). The GAMAQI is an advisory document that provides Lead Agencies, consultants, and project applicants with analysis guidance and uniform procedures for addressing air quality impacts in environmental documents. Local jurisdictions are not required to utilize the methodology outlined therein. This document describes the criteria that SJVAPCD uses when reviewing and commenting on the adequacy of environmental documents. It recommends thresholds for determining whether or not projects would have significant adverse environmental impacts, identifies methodologies for predicting project emissions and impacts, and identifies measures that can be used to avoid or reduce air quality impacts. An update of the GAMAQI was approved on January 10, 2002, and is used as a guidance document for this analysis. The SJVAPCD is currently in the process of updating the GAMAQI and has a February 2015 version available for consideration of approval by the SJVAPCD Board. At the time that this document was written, it was estimated that the Board would consider approval of the GAMQI in March 2015.

It is noted here that absent an approval of the 2015 GAMQI, we are required to use the 2002 GAMAQI as the guidance document for this analysis with certain caveats as directed by the SJVAPCD. For instance, the SJVAPCD has begun a transition to the California Emissions Estimator Model (CalEEMod) for preparing air impact assessments within the San Joaquin Valley air basin. CalEEMod is the newest computer emissions estimating model developed by the California Air Pollution Control Officers Association (CAPCOA). The model calculates criteria pollutant and greenhouse gas (GHG) emissions from a variety of land uses, including residential, commercial, retail, and industrial projects. CalEEMod also calculates the benefits of implementing mitigation measures, including GHG mitigation measures. This analysis utilizes the CalEEMod model as directed by the SJVAPCD.

SJVAPCD RULES AND REGULATIONS

The SJVAPCD has adopted numerous rules and regulations to implement its air quality plans. Following, are significant rules that will apply to the proposed Project.

Regulation VIII – Fugitive PM10 Prohibitions

Regulation VIII is comprised of District Rules 8011 through 8081 which are designed to reduce PM10 emissions (predominantly dust/dirt) generated by human activity, including construction and demolition activities, road construction, bulk materials storage, paved and unpaved roads, carryout and track out, landfill operations, etc.

Rule 4002 – National Emission Standards for Hazardous Air Pollutants

Rule 4002 applies in the event an existing building will be renovated, partially demolished or removed (National Emission Standards for Hazardous Air Pollutants); this rule applies to all sources of Hazardous Air Pollutants.

Rule 4102 – Nuisance

Rule 4102 dictates that if a source operation emits or may emit air contaminants or other materials such that the emissions create a public nuisance, the owner/operator may be subject to APCD enforcement action.

Rule 4103 – Open Burning

Rule 4103 prohibits the burning of agricultural material when the land is converting from agriculture to non-agricultural (i.e. urban) purposes.

Rule 4601 – Architectural Coatings

Rule 4601 limits emissions of volatile organic compounds from architectural coatings by specifying storage, cleanup and labeling requirements.

Rule 4641 – Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations

If asphalt paving will be used, then paving operations of the proposed Project will be subject to Rule 4641. This rule applies to the manufacture and use of cutback asphalt, slow cure asphalt and emulsified asphalt for paving and maintenance operations.

Rule 8021 – Construction, Demolition, Excavation, and Other Earthmoving Activities

District Rule 8021 requires owners or operators of construction projects to submit a Dust Control Plan to the District if at any time the project involves non-residential developments of five or more acres of disturbed surface area or moving, depositing, or relocating of more than 2,500 cubic yards per day of bulk materials on at least three days of the project. The proposed Project will meet these criteria and will be required to submit a Dust Control Plan to the District in order to comply with this rule.

Rule 9510 – Indirect Source Review

Rule 9510 indirectly limits the vehicular emissions contribution of new development to regional air pollution. Through an application and review process, the developer may incorporate emission-reduction features in the project or may pay the fee prescribed in the rule. Fees collected by the APCD are indexed to the cost of providing offsetting mitigation and are used for that purpose. The provisions of the rule are described in more detail in the analysis of environmental impacts and mitigation measures.

City of Manteca General Plan

GOALS: AIR QUALITY

- Goal AQ-1. Improve air quality by:
  - Achieving and maintaining ambient air quality standards established by the U.S. Environmental Protection Agency, the California Air Resources Board, and the San Joaquin Air Pollution Control District;
  - Minimizing public exposure to toxic or hazardous air pollutants; and
  - Minimizing public exposure to pollutants that create a public nuisance, such as unpleasant odors.
- Goal AQ-2. Integrate air quality planning with land use and transportation planning processes in order to reduce vehicle miles traveled in the City and by commuters.
- Goal AQ-3. Increase opportunities for alternatives to internal combustion automobiles including, but not limited to, public transportation, bicycles, walking and alternative fuel vehicles including hybrid gas-electric, electric and compressed natural gas.
- Goal AQ-4. Reduce air emissions through energy conservation.
- Goal AQ-5. Reduce greenhouse gases from activities within the City by amounts needed to demonstrate consistency with State of California greenhouse gas reduction targets.

POLICIES: AIR QUALITY – REGIONAL COORDINATION

- AQ-P-1. Cooperate with other agencies to develop a consistent and coordinated approach to reduction of air pollution and management of hazardous air pollutants.

IMPLEMENTATION: AIR QUALITY - REGIONAL COORDINATION

- AQ-I-1. Work with the San Joaquin Valley Air Pollution Control District (APCD) to implement the Air Quality Management Plan (AQMP).
  - Cooperate with the APCD to develop consistent and accurate procedures for evaluating project-specific and cumulative air quality impacts.
  - Cooperate with the APCD and the California Air Resources Board in their efforts to develop a local airshed model.
  - Cooperate with the APCD in their efforts to develop a cost/benefit analysis of possible control strategies (mitigation measures to minimize short and long-term stationary

and area source emissions as part of the development review process, and monitoring measures to ensure that mitigation measures are implemented.

- AQ-I-2. In accordance with CEQA, submit development proposals to the APCD for review and comment prior to decision.
- AQ-I-3. Cooperate with the San Joaquin County Environmental Health Department in identifying hazardous material users and in developing a hazardous materials management plan.

POLICIES: AIR QUALITY - LAND USE

- AQ-P-2. Develop a land use plan that will help to reduce the need for trips and will facilitate the common use of public transportation, walking, bicycles, and alternative fuel vehicles.
- AQ-P-3. Segregate and provide buffers between land uses that typically generate hazardous or obnoxious fumes and residential or other sensitive land uses.

IMPLEMENTATION: AIR QUALITY - LAND USE

- AQ-I-4. Encourage mixed-use development that is conveniently accessible by pedestrians and public transit.
- AQ-I-5. Locate employment, school, and daily shopping destinations near residential areas.
- AQ-I-6. Locate higher intensity development such as multi-family housing, institutional uses, services, employment centers and retail along existing and proposed transit corridors.
- AQ-I-7. Locate public facilities in areas easily served by current and planned public transportation.
- AQ-I-8. Prior to entitlement of a project that may be an air pollution point source, such as a manufacturing and extracting facility, the developer shall provide documentation that the use is located and appropriately separated from residential areas and sensitive receptors (e.g., homes, schools, and hospitals).

POLICIES: AIR QUALITY - TRANSPORTATION

- AQ-P-4. Develop and maintain street systems that provide for efficient traffic flow and thereby minimize air pollution from automobile emissions.
- AQ-P-5. Develop and maintain circulation systems that provide alternatives to the automobile for transportation, including bicycles routes, pedestrian paths, bus transit, and carpooling.
- AQ-P-6. Coordinate public transportation networks, including trains, local bus service, regional bus service and rideshare facilities to provide efficient public transit service.

IMPLEMENTATION: AIR QUALITY - TRANSPORTATION

- AQ-I-9. Maintain acceptable traffic levels of service (LOS) as specified in the Circulation Element.

- AQ-I-10. In new subdivisions, require the internal street system to include the installation of dedicated pedestrian/bicycle pathways connecting to adjacent residential and commercial areas as well as schools, parks and recreational areas.
- AQ-I-11. Provide adequate pedestrian and bikeway facilities for present and future transportation needs throughout the City.

POLICIES: AIR QUALITY - DUST AND OTHER AIRBORNE PARTICULATE MATERIALS

- AQ-P-7. New construction will be managed to minimize fugitive dust and construction vehicle emissions.
- AQ-P-8. Woodburning devices shall meet current standards for controlling particulate air pollution.
- AQ-P-9. Burning of any combustible material within the City will be controlled to minimize particulate air pollution.

IMPLEMENTATION: AIR QUALITY - DUST AND OTHER AIRBORNE PARTICULATE MATERIALS

- AQ-I-12. Construction activity plans shall include and/or provide for a dust management plan to prevent fugitive dust from leaving the property boundaries and causing a public nuisance or a violation of an ambient air standard.
  - Project development applicants shall be responsible for ensuring that all adequate dust control measures are implemented in a timely manner during all phases of project development and construction.
- AQ-I-13. All residences built in a new subdivision or housing development shall be equipped with conventional heating devices with sufficient capacity to heat all areas of the building without reliance on woodburning heating devices.
- AQ-I-14. All woodburning-heating devices installed shall meet EPA standards applicable at the time of project approval.

POLICIES: AIR QUALITY - REDUCE EMISSIONS FROM ENERGY GENERATING FACILITIES

- AQ-P-10. Encourage energy efficient building designs.

IMPLEMENTATION: AIR QUALITY - REDUCE EMISSIONS FROM ENERGY GENERATING FACILITIES

- AQ-I-15. Design review criteria shall include the following considerations, at a minimum:
  - The developer of a sensitive air pollution receptor shall submit documentation that the project design includes appropriate buffering (e.g., setbacks, landscaping) to separate the use from highways, arterial streets, hazardous material locations and other sources of air pollution or odor.
  - Promote the use of new and replacement fuel storage tanks at refueling stations that are clean fuel compatible, if technically and economically feasible.
  - The use of energy efficient lighting (including controls) and process systems beyond Title 24 requirements shall be encouraged where practicable (e.g., water heating, furnaces, boiler units, etc.)

- The use of energy efficient automated controls for air conditioning beyond Title 24 requirements shall be encouraged where practicable.
- Promote solar access through building siting to maximize natural heating and cooling, and landscaping to aid passive cooling and to protect from winds.

POLICIES: AIR QUALITY - GREENHOUSE GAS EMISSIONS

- AQ-P-11. Prepare and maintain a Climate Action Plan and community greenhouse gas emission inventory for sectors with the potential for control or influence by the City that demonstrates consistency with State of California targets.
- AQ-P-12. Development projects shall incorporate the applicable strategies of the City of Manteca Climate Action Plan as needed to demonstrate consistency with CAP reduction targets and AB 32.

IMPLEMENTATION: AIR QUALITY - GREENHOUSE GASES

- AQ-I-16. Track and monitor aspects of development related to CAP strategies on an ongoing basis to measure progress in achieving CAP reduction targets.
- AQ-I-17. Track implementation of municipal and community projects and programs related to energy efficiency, transit service improvements, transportation facilities such as bicycle paths and lanes, pedestrian infrastructure, and other projects that reduce greenhouse gas emissions throughout the community.
- AQ-I-18. Update CAP emission inventories, targets, and strategies to reflect new State of California greenhouse gas reduction targets when adopted for later years and to reflect the benefits of any new State and federal regulatory actions that reduce greenhouse gas emissions to demonstrate continued consistency with State targets.

3.3.3 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the proposed Project will have a significant impact on the environment associated with air quality if it will:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Cause a violation of any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);
- Expose sensitive receptors to substantial pollutant concentrations;
- Create objectionable odors affecting a substantial number of people.

IMPACTS AND MITIGATION MEASURES

Impact 3.3-1: Project operation has the potential to cause a violation of an air quality standard or contribute substantially to an existing or projected air quality violation. (Significant and Unavoidable)

The SJVAPCD is tasked with implementing programs and regulations required by the Federal Clean Air Act and the California Clean Air Act. In that capacity, the SJVAPCD has prepared plans to attain Federal and State ambient air quality standards. To achieve attainment with the standards, the SJVAPCD has established thresholds of significance for criteria pollutant emissions in their *SJVAPCD Guidance for Assessing and Mitigating Air Quality Impacts* (2015). Projects with emissions below the thresholds of significance for criteria pollutants would be determined to "Not conflict or obstruct implementation of the District's air quality plan".

The proposed Project would be a direct and indirect source of air pollution, in that it would generate and attract vehicle trips in the region (mobile source emissions) and it would increase area source emissions and energy consumption. The mobile source emissions would be entirely from vehicles, while the area source emissions would be primarily from the use of natural gas fuel combustion, landscape fuel combustion, consumer products, and architectural coatings.

CalEEMod™ (v.2016.3.1) was used to estimate emissions for buildout of the proposed Project. Table 3.3-8 shows the emissions, which include mobile, area source, and energy emissions of criteria pollutants that would result from operations of the proposed Project.

TABLE 3.3-8: OPERATIONAL BUILDOUT GENERATED EMISSIONS

	ROG		*NO_X*		*PM_{10}*		*$PM_{2.5}$*	
	tons/year		tons/year		tons/year		tons/year	
Thresholds	*≤ 10 tons/year*		*≤ 10 tons/year*		*≤ 15 tons/year*		*≤ 15 tons/year*	
Category	UM	M	UM	M	UM	M	UM	M
Area	11.3449	10.6783	0.5825	0.5825	0.0900	0.0900	0.0900	0.0900
Energy	0.2087	0.1802	1.7915	1.5469	0.1442	0.1245	0.1442	0.1245
Mobile	8.5440	8.2354	85.5607	81.7478	18.7355	16.9140	5.3381	4.8226
Total	**20.0976**	**19.0939**	**87.9347**	**83.8772**	**18.9697**	**17.1285**	**5.5723**	**5.0370**
Threshold Exceeded?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**No**
Percent Reduction	**4.99**		**4.61**		**9.71**		**9.61**	

NOTES: UM = UNMITIGATED, M = MITIGATED; THE AIR DISTRICT IS ATTAINMENT FOR CO, AND SO_2. CO SCREENING IS PERFORMED UNDER IMPACT 3.3-3.

SOURCE: CALEEMOD (V.2016.3.1).

The SJVAPCD has established their thresholds of significance by which the Project emissions are compared against to determine the level of significance. The SJVAPCD has established operations related emissions thresholds of significance as follows: 10 tons per year of oxides of nitrogen (NO_x), 10 tons per year of reactive organic gases (ROG), 15 tons per year particulate matter of 10 microns or less in size (PM_{10}), and 15 tons per year particulate matter of 2.5 microns or less in size ($PM_{2.5}$). If the proposed Project's emissions will exceed the SJVAPCD's threshold of significance for operational-generated emissions, the proposed Project will have a significant impact on air quality and all feasible mitigation are required to be implemented to reduce emissions to the extent

feasible. As shown in Table 3.3-8 above, annual emissions of ROG, NOx, and PM_{10} exceed the SJVAPCD thresholds of significance.

The long-term operational GHG emissions estimate for buildout of the proposed Project incorporates the potential area source and vehicle emissions, and emissions associated with utility and water usage, and wastewater and solid waste generation. The modeling included mitigation inputs for the year 2019 including the following:

Traffic Mitigation

- Increase Density (4.9 dwelling units per acre)
- Improve Walkability Design (minimum 152 intersections per square mile)
- Improve Destination Accessibility (minimum distance to downtown is 6.4 miles)
- Increase Transit Accessibility in the Project area (minimum distance to transit stops is 0.9 miles)
- Improve Pedestrian Network so that the Project area connects to offsite pedestrian networks
- Provide traffic calming measures on at least 25% of street segments and intersections

Energy Mitigation

- Exceed Title 24 by 15%
- Install High Efficiency Lighting
- Install High Efficiency Appliances within buildings

Area Mitigation

- Use Low VOC Cleaning Supplies
- Use Only Natural Gas Hearths

Water Mitigation

- Apply a Water Conservation Strategy to achieve a 20% reduction in indoor and outdoor water usage
- Install low flow bathroom faucet
- Install low-flow kitchen faucet
- Install low-flow toilet
- Install low-flow shower
- Use water-efficient irrigation systems

CalEEMod™ (v.2016.3.1) mitigation assumptions described above were incorporated into the model. The ROG, NOx, and PM_{10} would exceed the SJVAPCD thresholds of significance for operations even with mitigation. The proposed Project is subject to the SJVAPCD Rule 9510 (Indirect Source Rule), which could result in substantial mitigation of emissions beyond what is reflected in the modeling outputs. The reductions are accomplished by the incorporation of mitigation measures into projects and/or by the payment of an Indirect Source Rule fee for any

required reductions that have not been accomplished through Project mitigation commitments. The current fees are $9,350 per ton of NO_x, although these are subject to adjustments by the SJVAPCD. The actual calculations will be accomplished by the SJVAPCD and Project applicants as the Project (i.e. or portions of the project) are brought forward for approval under Rule 9510. However, even with the application of the ISR and the mitigation measures described above, emissions levels may remain above the defined thresholds of significance for the Project as a whole. As such, operation of the proposed Project would have a **significant and unavoidable** impact relative to operational air emissions.

MITIGATION MEASURE(S)

Mitigation Measure 3.3-1*: Prior to final approval of improvement plans, the Project proponent shall submit an Air Impact Assessment (AIA) application to the San Joaquin Valley Air Pollution Control District for District Rule 9510 Indirect Source Review (ISR) to obtain AIA approval from the District for the phase or Project component that is to be constructed. Prior to the issuance of a building permit of each individual phase or Project component, the Project proponent shall incorporate mitigation measures into the proposed Project and demonstrate compliance with District Rule 9510 including payment of all fees.*

Mitigation Measure 3.3-2*: Prior to the approval of improvement plans, the Project proponent shall incorporate the following features into Project plans:*

- *Bus turnouts and transit improvements where requested by the San Joaquin RTD.*
- *Continuous public sidewalks and/or multi-use trails adjacent to all proposed public streets.*
- *Pavement and striping for bike lanes/paths.*
- *Street lighting.*
- *Pedestrian signalization, signage and safety designs at signalized intersections.*
- *Shade trees to shade sidewalks in street-side landscaping areas.*

Mitigation Measure 3.3-3*: Prior to the approval of improvement plans for non-residential projects, the Project proponent shall prepare and implement a transportation demand management (TDM) plan for the non-residential portions of the Project that includes, but is not limited to, the following measures subject to the review and approval of the City of Manteca:*

- *Provide secure bicycle parking in conjunction with the non-residential portion of the Project.*
- *Provide on-site amenities that encourage alternative transportation modes such as locker, shower, and secure bike storage facilities.*
- *Coordinate SJCOG's Commute Connection Program*

Impact 3.3-2: Project construction has the potential to cause a violation of an air quality standard or contribute substantially to an existing or projected air quality violation. (Less than Significant with Mitigation)

Construction Activities/Schedule: Construction activities will consist of multiple phases over several years. These construction activities can be described as site improvements (grading,

underground infrastructure, and topside improvements) and vertical construction (building construction and architectural coatings). For purposes of this analysis, it is assumed that the entire Project is builtout from 2016 through late 2021. This construction schedule is considered a worst-case scenario. Actual construction emissions will likely be spread out over an extended period of time.

Site Improvements: The exact construction schedule of the entire Project is largely dependent on market demands. For purposes of this analysis it is assumed that site improvements are installed in one phase. This approach will present a more conservative and worst-case scenario.

The site improvement phase of construction will begin with site preparation and demolition. This step will include the use of dozers, backhoes, and loaders to strip (clear and grub) all organic materials and the upper half-inch to inch of soil from the Project site. This task will generally take less than two months to complete and will include vehicle trips from construction workers. Given that the Project site lacks significant vegetation, this step will likely be less than the assumed 26 days.

After the site is striped of organic materials grading will begin. This activity will involve the use of excavators, graders, dozers, scrappers, loaders, and backhoes to move soil around the Project site to create specific engineered grade elevations and soil compaction levels. Grading the Project site would take approximately 100 days and will include vehicle trips from construction workers. *(Note: It would be possible to grade the site under a more compacted schedule with extra equipment operating or under a longer timeframe with less equipment.).*

The last task is to install the topside improvements, which includes pouring concrete curbs, gutters, sidewalks, and access aprons and then paving of all streets and parking lots. This task will involve the use of pavers, paving equipment, and rollers and will take approximately four months and will include vehicle trips from construction workers. *(Note: It would be possible to install the topside improvements under a more compacted schedule with extra equipment operating or under a longer timeframe with less equipment).*

Building Construction/Architectural Coatings: Building construction involves the vertical construction of structures and landscaping around the structures. This task will involve the use of forklifts, generator sets, welders and small tractors/loaders/backhoes. The exact construction schedule of the entire Project is largely dependent on market demands. For purposes of this analysis it is assumed that the entire Project is constructed in approximately three years. The actual building construction phase may be much shorter or much longer. Architectural coatings involve the interior and exterior painting associated with the structures. This task will generally begin four or five months after construction begins on the structure and will generally be completed with the completion of the individual buildings.

Construction Emissions: The proposed Project is larger in scope and size then the SJVAPCD's Small Project Analysis Level (SPAL), therefore, a quantification of the emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$ that will be emitted by Project construction has been performed. CalEEMod™ (v. 2013.2.2) was used to estimate construction emissions for the proposed Project. In addition to the

operational model assumptions presented under Impact 3.3-1 above, below is a list of model assumptions used in the construction screens of CalEEMod. Table 3.3-9 presents the estimated construction phase schedule, which shows the duration of each construction phase. Table 3.3-10 shows the off-road construction equipment used during construction for each phase. Following these tables are a list of default factors that were used in the model.

MODEL ASSUMPTIONS (CONSTRUCTION)

TABLE 3.3-9: CONSTRUCTION PHASE

PHASE NUMBER	*PHASE NAME*	*START DATE*	*END DATE*	*# DAYS/WEEK*	*# DAYS*
1	Demolition	6/1/2017	6/1/2017	5	1
2	Site Preparation	6/1/2017	7/6/2017	5	26
3	Grading	7/6/2017	11/22/2017	5	100
4	Building Construction	12/22/2017	7/1/2021	5	920
5	Paving	11/22/2017	3/21/2018	5	86
6	Architectural Coating	4/22/2018	10/29/2021	5	920

SOURCE: CALEEMOD (V.2016.3.1)

TABLE 3.3-10: OFF-ROAD EQUIPMENT

EQUIPMENT TYPE	*UNIT AMOUNT*	*HOURS/DAY*	*HORSEPOWER*	*LOAD FACTOR*
DEMOLITION				
Concrete/Industrial Saws	1	8.00	81	0.73
Excavators	1	8.00	162	0.38
Rubber Tired Dozers	1	8.00	255	0.40
SITE PREPARATION				
Rubber Tired Dozers	3	8.00	255	0.40
Tractors/Loaders/Backhoes	4	8.00	97	0.37
GRADING				
Excavators	4	8.00	162	0.38
Graders	2	8.00	174	0.41
Rubber Tired Dozers	2	8.00	255	0.40
Scrapers	2	8.00	361	0.48
Tractors/Loaders/Backhoes	2	8.00	97	0.37
BUILDING CONSTRUCTION				
Cranes	1	7.00	226	0.29
Forklifts	4	8.00	89	0.20
Generator Sets	4	8.00	84	0.74
Tractors/Loaders/Backhoes	4	4.00	97	0.37
Welders	1	4.00	46	0.45
PAVING				
Pavers	2	8.00	125	0.42
Paving Equipment	2	8.00	130	0.36
Rollers	2	8.00	80	0.38
ARCHITECTURAL COATINGS				
Air Compressors	4	6.00	78	0.48

SOURCE: CALEEMOD (V.2016.3.1)

Table 3.3-11 shows the construction emissions for the construction years 2016 through late 2021.

TABLE 3.3-11: CONSTRUCTION EMISSIONS (UNMITIGATED)

THRESHOLDS	*ROG*	*NOX*	*PM_{10} TOTAL*	*$PM_{2.5}$ TOTAL*
	≤ 10 TONS/YEAR	*≤ 10 TONS/YEAR*	*≤ 15 TONS/YEAR*	*≤ 15 TONS/YEAR*
2017	0.5426	6.0119	1.4261	0.7573
2018	5.2752	8.3471	1.2564	0.5780
2019	6.9489	7.3205	1.2275	0.5256
2020	6.8657	6.7040	1.1907	0.4877
2021	5.3400	3.0959	0.6189	0.2388
Maximum	**6.9489**	**8.2653**	**1.4261**	**0.7573**
Threshold Exceeded (in any one year)?	**No (not exceeded in any one year)**	**No (not exceeded in any one year)**	**No (not exceeded in any one year)**	**No (not exceeded in any one year)**

NOTES: THE AIR DISTRICT IS ATTAINMENT FOR CO, AND SO_2.

SOURCE: CALEEMOD (V.2016.3.1)

The SJVAPCD has established construction related emissions thresholds of significance as follows: 10 tons per year of NO_x, 10 tons per year of ROG, or 15 tons per year of PM_{10}. If the proposed Project's emissions will exceed the SJVAPCD's threshold of significance for construction-generated emissions, the proposed Project will have a significant impact on air quality and all feasible mitigation are required to be implemented to reduce emissions. As shown in Table 3.3-11 above, annual emissions of ROG, NO_x, PM_{10}, and $PM_{2.5}$ will not exceed the SJVAPCD thresholds of significance in any given year. However, regardless of emission quantities, the SJVAPCD requires construction related mitigation in accordance with their rules and regulations. Implementation of the following mitigation measures will ensure that the proposed Project would reduce construction related emissions to the extent possible. It is noted that this modeling scenario and construction schedule assumptions are based on a worst-case scenario. Therefore, with the implementation of mitigation measures, the proposed Project would have a **less than significant** impact related to construction emissions.

MITIGATION MEASURE(S)

Mitigation Measure 3.3-4: *Prior to the commencement of construction activities, the Project proponent shall prepare and submit a Dust Control Plan that meets all of the applicable requirements of APCD Rule 8021, Section 6.3, for the review and approval of the APCD Air Pollution Control Officer.*

Mitigation Measure 3.3-5: *During all construction activities, the Project proponent shall implement dust control measures, as required by APCD Rules 8011-8081, to limit Visible Dust Emissions to 20% opacity or less. Dust control measures shall include application of water or chemical dust suppressants to unpaved roads and graded areas, covering or stabilization of transported bulk materials, prevention of carryout or trackout of soil materials to public roads, limiting the area subject to soil disturbance, construction of wind barriers, access restrictions to inactive sites as required by the applicable rules.*

Mitigation Measure 3.3-6: *During all construction activities, the Project proponent shall implement the following dust control practices identified in Tables 6-2 and 6-3 of the GAMAQI (San Joaquin Valley APCD, 2002).*

a. *All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, or vegetative ground cover.*

b. *All on-site unpaved roads and off-site unpaved access roads shall be effectively stabilized of dust emissions using water or chemical stabilizer/suppressant.*

c. *All land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities shall control fugitive dust emissions by application of water or by presoaking.*

d. *When materials are transported off-site, all material shall be covered, effectively wetted to limit visible dust emissions, or at least six inches of freeboard space from the top of the container shall be maintained.*

e. *All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at least once every 24 hours when operations are occurring. The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. Use of blower devices is expressly forbidden.*

f. *Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/suppressant.*

g. *Limit traffic speeds on unpaved roads to 5 mph; and*

h. *Install sandbags or other erosion control measures to prevent silt runoff to public roadways from sites with a slope greater than one percent.*

Mitigation Measure 3.3-7: *Architectural coatings applied to all structures in the Project site shall meet or exceed volatile organic compound (VOC) standards set in APCD Rule 4601. The ODS shall submit to the APCD a list of architectural coatings to be used and shall indicate how the coatings meet or exceed VOC standards. If the APCD determines that any architectural coatings do not meet VOC standards, the ODS shall replace the identified coatings with those that meet standards.*

Mitigation Measure 3.3-8: *Asphalt paving shall be applied in accordance with APCD Rule 4641. This rule applies to the manufacture and use of cutback asphalt, slow cure asphalt and emulsified asphalt for paving and maintenance operations.*

Impact 3.3-3: The proposed Project has the potential to have carbon monoxide hotspot impacts. (Less than Significant)

Project traffic would increase concentrations of carbon monoxide along streets providing access to the Project site. Carbon monoxide is a local pollutant (i.e., high concentrations are normally only found very near sources). The major source of carbon monoxide, a colorless, odorless, poisonous gas, is automobile traffic. Elevated concentrations (i.e. hotspots), therefore, are usually only found near areas of high traffic volume and congestion.

The SJVAPCD recommends utilizing a screening approach for analyzing CO concentrations to determine if dispersion modeling is warranted. The methodology provides lead agencies with a conservative indication of whether Project-generated vehicle trips will result in the generation of CO emissions that contribute to an exceedance of the thresholds of significance. The recommended screening criteria are divided into two tiers, as described below.

First Tier: The proposed Project will result in a less-than-significant impact to air quality for local CO if:

- Traffic generated by the proposed Project will not result in deterioration of intersection level of service (LOS) to LOS E or F; and
- The Project will not contribute additional traffic to an intersection that already operates at LOS of E or F.

For the proposed Project, the first tier is not met because the operations at the Yosemite Avenue/McKinley Avenue, Yosemite Avenue / McKinley Avenue, Woodward Avenue / Airport Way, Eastbound SR 120 Ramps / Airport Way, Atherton Drive / Dutch Harbor Way / Commercial Driveway intersections under the Existing Plus Project conditions would operate at peak hour LOS E or F. The screening approach requires that if the first tier of screening criteria is not met then the second tier of screening criteria shall be examined.

Second Tier: If all of the following criteria are met, the proposed Project will result in a less-than-significant impact to air quality for local CO.

- The Project will not result in an affected intersection experiencing more than 31,600 vehicles per hour;
- The Project will not contribute traffic to a tunnel, parking garage, bridge underpass, urban street canyon, or below-grade roadway; or other locations where horizontal or vertical mixing of air will be substantially limited; and
- The mix of vehicle types at the intersection is not anticipated to be substantially different from the County average (as identified by the EMFAC or CalEEMod models).

The proposed Project screens out under the second tier because it meets all three criteria. First, the intersections that will operate at LOS E or F (listed above), will experience a maximum of 27,730 vehicles per day, and much less in the peak hour. The maximum of daily trips is significantly below the 31,600 vehicles per hour threshold. Secondly, these intersections do not include a tunnel, parking garage, bridge underpass, urban street canyon, or below-grade roadway; or other locations where horizontal or vertical mixing of air will be substantially limited. Lastly, the mix of vehicle types at these intersections is not anticipated to be substantially different from the County average (Fehr and Peers, 2016). As such, the proposed Project screens out satisfactorily under tier 2.

Conclusion

The traffic study for the proposed Project examined Level of Service (LOS) for both road segments and intersections affected by the proposed Project. There are several intersections that would

operate at an LOS E or F during the peak hour for Existing Plus Project conditions. The screening approach for analyzing CO concentrations was used to analyze CO impacts for the proposed Project. The proposed Project screens out satisfactorily under tier 2 based on a peak hour vehicle per hour that is low, combined with the fact that the Project does not include any tunnels, parking garages, bridge underpasses, urban street canyons, or below-grade roadways, or other locations where horizontal or vertical mixing of air will be substantially limited. The Project is within an attainment area for carbon monoxide (ambient air quality standards are currently attained) and in an area with low background concentrations, changes in carbon monoxide levels resulting from the proposed Project would not result in violations of the ambient air quality standards, and would represent a **less than significant** impact.

Impact 3.3-4: The proposed Project has the potential for public exposure to toxic air contaminants. (Less than Significant)

A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air. However, their high toxicity or health risk may pose a threat to public health even at very low concentrations. In general, for those TACs that may cause cancer, there is no concentration that does not present some risk. This contrasts with the criteria pollutants for which acceptable levels of exposure can be determined and for which the state and federal governments have set ambient air quality standards.

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the U.S. Environmental Protection Agency (EPA) regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007) and identified a group of 93 compounds emitted from mobile sources. In addition, EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment. These are acrolein, benzene, 1,3-butidiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter.

The 2007 EPA rule requires controls that will dramatically decrease Mobile Source Air Toxics (MSAT) emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using EPA's MOBILE6.2 model, even if vehicle activity (VMT) increases by 145 percent, a combined reduction of 72 percent in the total annual emission rate for the priority MSAT is projected from 1999 to 2050. California maintains stricter standards for clean fuels and emissions compared to the national standards, therefore it is expected that MSAT trends in California will decrease consistent with or more than the U.S. EPA's national projections.

The California Air Resources Board (CARB) published the *Air Quality and Land Use Handbook: A Community Health Perspective* (2007) to provide information to local planners and decision-makers about land use compatibility issues associated with emissions from industrial, commercial and mobile sources of air pollution. The CARB Handbook indicates that mobile sources continue to

be the largest overall contributors to the State's air pollution problems, representing the greatest air pollution health risk to most Californians. The most serious pollutants on a statewide basis include diesel exhaust particulate matter (diesel PM), benzene, and 1,3-butadiene, all of which are emitted by motor vehicles. These mobile source air toxics are largely associated with freeways and high traffic roads. Non-mobile source air toxics are largely associated with industrial and commercial uses. Table 3.3-12 provides the California Air Resources Board minimum separation recommendations on siting sensitive land uses.

TABLE 3.3-12: CARB MINIMUM SEPARATION RECOMMENDATIONS ON SITING SENSITIVE LAND USES

SOURCE CATEGORY	*ADVISORY RECOMMENDATIONS*
Freeways and High-Traffic Roads	• Avoid siting new sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day.
Distribution Centers	• Avoid siting new sensitive land uses within 1,000 feet of a distribution center (that accommodates more than 100 trucks per day, more than 40 trucks with operating transport refrigeration units (TRUs) per day, or where TRU unit operations exceed 300 hours per week). • Take into account the configuration of existing distribution centers and avoid locating residences and other new sensitive land uses near entry and exit points.
Rail Yards	• Avoid siting new sensitive land uses within 1,000 feet of a major service and maintenance rail yard. • Within one mile of a rail yard, consider possible siting limitations and mitigation approaches.
Ports	• Avoid siting of new sensitive land uses immediately downwind of ports in the most heavily impacted zones. Consult local air districts or the CARB on the status of pending analyses of health risks.
Refineries	• Avoid siting new sensitive land uses immediately downwind of petroleum refineries. Consult with local air districts and other local agencies to determine an appropriate separation.
Chrome Platers	• Avoid siting new sensitive land uses within 1,000 feet of a chrome plater.
Dry Cleaners Using Perchloro-ethylene	• Avoid siting new sensitive land uses within 300 feet of any dry cleaning operation. For operations with two or more machines, provide 500 feet. For operations with 3 or more machines, consult with the local air district. • Do not site new sensitive land uses in the same building with perc dry cleaning operations.
Gasoline Dispensing Facilities	• Avoid siting new sensitive land uses within 300 feet of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater). A 50 foot separation is recommended for typical gas dispensing facilities.

SOURCE: AIR QUALITY AND LAND USE HANDBOOK: A COMMUNITY HEALTH PERSPECTIVE (CARB 2005).

There are sensitive receptors such as residences and parks that are proposed as part of this Project. The Project site is located within 500 feet of a freeway, SR 120. The majority of the proposed residences and all of the proposed park amenities are well beyond the minimum separation distance from toxic air emitters. Approximately seven of the proposed 1,265 lots would be located approximately 319 to 495 feet south of SR 120. The remaining lots would be 500 feet to approximately 6,000 feet (approximately 1.14 miles) south of SR 120. The seven lots within 500 feet of SR 120 are all located in the northeastern portion of the Project site, south of the proposed Atherton Drive connection. The measurements were taken from the closest lane of SR 120 to the proposed residences (i.e., the southernmost eastbound lane) to the northern lot line of each lot. The City's Zoning Code requires uses within the One-Family Dwelling Zoning District (R-1) to have a minimum 15-foot rear yard setback (i.e., the distance between the structure and the property line). As discussed in Section 2.0, the land use and development standards for the proposed residential development areas shall comply with all requirements that apply to the corresponding

zoning in the Manteca Municipal Code. As such, with the required setbacks, six of the proposed 1,265 residences would be located within 500 feet of the nearest travel lane of SR 120.

State law restricts the siting of new schools within 500 feet of a freeway, urban roadways with 100,000 vehicles/day, or rural roadways with 50,000 vehicles with some exceptions. However, no such requirements apply to the siting of residences, day care centers, playgrounds, or medical facilities. The available data show that exposure to vehicle-related pollutants is greatly reduced at approximately 300 feet. Specifically, a southern California study (Zhu, 2002) showed measured concentrations of vehicle-related pollutants, including ultra-fine particles, decreased dramatically within approximately 300 feet of the 710 and 405 freeways.[1] This study is cited by CARB as a reference for their minimum separation recommendations, summarized above. According to this study, total particulate matter in the size range of 6 to 25 nanometers (nm) decreases by about 80% when the distance from the freeways is about 100 meters (or approximately 328 feet). Concentrations of CO and black carbon[2] exhibited similar trends as the distance to freeways increased. Overall, total particulate matter, CO, and black carbon decayed exponentially as distance from the freeways increased.

The 710 and 405 freeways, the locations studied in the southern California study (Zhu, 2002), are high volume freeways, especially when compared to SR 120. Freeway 405 is one of the busiest freeways in the Los Angeles basin. Freeway 710 is a major truck route with a large percent of the traffic consisting of heavy-duty diesel trucks. During the sampling period for the southern California study (Zhu, 2002), traffic density along Freeway 710 ranged from 180 to 230 vehicles/min passing the sampling site, total for both directions, with approximately 25% of the vehicles being heavy diesel trucks. Freeway 710 carries approximately 221,000 vehicles per day[3], while the existing average daily trips along SR 120 is approximately 77,000.

According to the CARB Air Quality and Land Use Handbook: A Community Health Perspective, the risk at that distance for other freeways will vary based on local conditions – it may be higher or lower. However, in all these analyses the relative exposure and health risk dropped substantially within the first 300 feet. The relatively low daily traffic volume along SR 120 compared to the 710 and 405 freeways would result in reduced exposure to vehicle-related pollutants.

The proposed Project does not include any of the source categories identified in the CARB minimum separation standards. However, a fueling station could be permitted within the General Commercial area upon issuance of a Minor Use Permit. Should future development of the General

[1] Zhu, Y., Hinds, W., Kim, S., Shen, S., Sioutas, C. Study of ultrafine particles near a major highway with heavy-duty diesel traffic. Atmospheric Environment 36 (2002) 4323-4335.

[2] Black carbon is the sooty black material emitted from gas and diesel engines and other sources that burn fossil fuel. Black carbon comprises a significant portion of particulate matter. Source: https://www.epa.gov/air-research/black-carbon-research/

[3] Volume between Imperial Highway and Firestone Boulevard. Source: Caltrans. 2015 Traffic Volumes on California State Highways. Available: http://www.dot.ca.gov/trafficops/census/docs/2015_aadt_volumes.pdf.

Commercial area include a fueling station, this would be the only source category identified in the CARB minimum separation standards that would be potentially developed as part of the Project. According to the Retail Fuel Report and Data for California released by the California Energy Commission, the average gasoline sales per station in 2012 was 1.58 million gallons per year. Therefore, should a fueling facility be constructed at the General Commercial area, the facility is anticipated to have a throughput under 3.6 million gallons per year because the fueling facility would be considered a neighborhood gas station. Implementation of the proposed Project would have a **less than significant** impact relative to this topic.

Impact 3.3-5: The proposed Project has the potential for exposure to odors. (Less than Significant)

While offensive odors rarely cause any physical harm, they can be very unpleasant, leading to considerable distress among the public and often generating citizen complaints to local governments and the SJVAPCD. The general nuisance rule (Heath and Safety Code §41700) is the basis for the threshold.

Examples of facilities that are known producers of odors include: Wastewater Treatment Facilities, Chemical Manufacturing, Sanitary Landfill, Fiberglass Manufacturing, Transfer Station, Painting/Coating Operations (e.g. auto body shops), Composting Facility, Food Processing Facility, Petroleum Refinery, Feed Lot/Dairy, Asphalt Batch Plant, and Rendering Plant.

The proposed Project does not propose uses that would create odors. Detailed information on specific site uses for the commercial area is unknown at this time based on the entitlement applications; however, future proposed uses within these areas will require discretionary review and approval by the City of Manteca. This may include a Conditional Use Permit and Site Plan Review, which would include a land use compatibility analysis to ensure that adjacent uses are not adversely affected by the planned businesses that would locate in the commercial area. At this time it is anticipated that the proposed Project will not emit, or place individuals within close proximity to, objectionable odors. As such, impacts would be **less than significant** regarding this environmental topic.

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This section describes the regulatory setting, regional setting, and impacts that are likely to result from Project implementation. The analysis contained in this section is intended to be at a Project-level, and covers impacts associated with the conversion of the entire site to an urban use. This section is based in part on the following technical studies: *City of Manteca General Plan 2023* (City of Manteca, as amended through 2013), and *Manteca General Plan 2023 Draft Environmental Impact Report* (City of Manteca, 2003), as well as site specific surveys and analysis. Comments received during the NOP comment period regarding biological resources include: SJCOG, Inc.

3.4.1 ENVIRONMENTAL SETTING

GEOMORPHIC PROVINCES/BIOREGION

The City of Manteca is in the western portion of the Great Valley Geomorphic Province of California. The Great Valley Province is a broad structural trough bounded by the tilted block of the Sierra Nevada on the east and the complexly folded and faulted Coast Ranges on the west. The San Joaquin River is located just south and west of the City. This major river drains the Great Valley Province into the San Joaquin Delta to the north, ultimately discharging into the San Francisco Bay to the northwest.

The City of Manteca is located within the San Joaquin Valley Bioregion, which is comprised of Kings County, most of Fresno, Kern, Merced, and Stanislaus counties, and portions of Madera, San Luis Obispo, and Tulare counties. The San Joaquin Valley Bioregion is the third most populous out of ten bioregions in the state, with an estimated 2 million people. The largest cities are Fresno, Bakersfield, Modesto, and Stockton. Interstate 5 and State Route 99 are the major north-south roads that run the entire length of the bioregion.

The bioregion is bordered on the west by the coastal mountain ranges. Its eastern boundary joins the southern two-thirds of the Sierra bioregion, which features Yosemite, Kings Canyon, and Sequoia National Parks. At its northern end, the San Joaquin Valley bioregion borders the southern end of the Sacramento Valley bioregion. To the west, south, and east, the bioregion extends to the edges of the valley floor.

Habitat in the bioregion includes vernal pools, valley sink scrub and saltbush, freshwater marsh, grasslands, arid plains, orchards, and oak savannah. Historically, millions of acres of wetlands flourished in the bioregion, but stream diversions for irrigation dried all but about five percent. Remnants of the wetland habitats are protected in this bioregion in publicly owned parks, reserves, and wildlife areas. The bioregion is considered the state's top agricultural producing region with the abundance of fertile soil.

LOCAL SETTING

Location

The Project site is in the southwestern portion of the City of Manteca city limits. The Project site comprises approximately 258.29 acres. The Project site is immediately southeast of the intersection of Bronzan Road and McKinley Avenue. The Project site is bounded on the north by an existing dirt roadway between Bronzan Road and Atherton Drive, on the east by South McKinley Avenue and an

existing residential subdivision, on the south by existing agricultural fields, and on the west by existing agricultural fields and the future Atherton Drive right-of-way. The Project site is located within Sections 11 and 12 of Township 2 South, Range 6 East MDBM. The Project site is shown on the Manteca, California, 7.5-minute series quadrangle map. Figures 2.0-1 and 2.0-2 show the Project's regional location and vicinity.

Topography

The Project site is relatively flat with natural gentle slope from north to south. Topographic features within the Project site include level agricultural fields, farm roads, and irrigation ditches/catch basins. Elevation ranges from approximately 20 to 30 feet above mean sea level.

Climate

The City of Manteca is in the northern portion of the San Joaquin Valley, which has a Mediterranean climate that is subject to cool, wet winters (often blanketed with fog) and hot, dry summers. The average annual precipitation is approximately 13.81 inches. Precipitation occurs as rain most of which falls between the months of November through April, peaking in January at 2.85 inches. The average temperatures range from December lows of 37.5 F to July highs of 94.3 F.

Vegetation

Vegetation on the Project site consists of agricultural, ruderal, and landscaping. Because of the active agricultural use, there is very limited natural vegetation on the Project site with the exception of the perimeter of the agricultural fields. Common plant species observed in these areas include: wild oat (*Avena barbata*), rip-gut brome (*Bromus diandrus*), softchess (*Bromus hordeaceus*) alfalfa (*Medicago sativa*), Russian thistle (Salsola tragus), Italian thistle (*Carduus pycnocephalus*), rough pigweed (*Amaranthus retroflexus*), sunflower (*Helianthus annuus*), tarragon (*Artemisia dracunculus*), coyote brush (*Baccharis pilularis*), prickly lettuce (*Lactuca serriola*), milk thistle (*Silybum marianum*), sow thistle (*Sonchus asper*), telegraph weed (*Heterotheca grandiflora*), barley (*Hordeum* sp.), mustard (*Brassica niger*), and heliotrope (*Heliotropium curassavicum*).

The irrigation ditch also has very limited vegetation due to the ongoing weed abatement program for these ditches. Common plant species in the irrigation ditches include: hyssop loosestrife (*Lythrum hyssopifolia*), curly dock (*Rumex crispus*), stinging nettles (*Urtica dioica*), willow herb (*Epilobium brachycarpum*), horseweed (*Conyza canadensis*), Canadian waterweed (*Elodea canadensis*), prickly lettuce (*Lactuca serriola*), spiny sowthistle (*Sonchus asper*), horehound (*Marrubium vulgare*), cocklebur (*Xanthium strumarium*), and yellow sweetclover (*Melilotus officinalis*).

Wildlife

Agricultural and ruderal vegetation found on the Project site provides habitat for both common and a few special-status wildlife populations. For example, some commonly observed wildlife species in the region include: California ground squirrel (*Spermophilus beecheyi*), California vole (*Microtus californicus*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus),*

American kestrel (*Falco sparverius*), white-tailed kite (*Elanus leucurus*), American killdeer (*Charadrius vociferus*), gopher snake (*Pituophis melanoleucus*), garter snake (*Thamnophis species*), and western fence lizard (*Sceloporus occidentalis*), as well as many native insect species. There are also several bat species in the region. Bats often feed on insects as they fly over agricultural and natural areas.

Locally common and abundant wildlife species are important components of the ecosystem. Due to habitat loss, many of these species must continually adapt to using agricultural, ruderal, and ornamental vegetation for cover, foraging, dispersal, and nesting.

Plant Communities

Agricultural and natural plant communities provide habitat for a variety of biological resources in the region. Sensitive habitats include those that are of special concern to resource agencies or those that are protected under a Habitat Conservation Plan, Natural Community Conservation Plan, the California Environmental Quality Act (CEQA), the Fish and Game Code, or the Clean Water Act (CWA). Additionally, sensitive habitats are usually protected under specific policies from local agencies.

The Project site is labeled as pasture land on the land cover types maps; however, the Project site has been actively used for agricultural use (i.e. crop production). Agricultural areas, including the Project site, are generally flat and well drained, and as a result are well suited for many crops. Alfalfa fields, hay, row crops, orchards, annual grasslands, cattle pasture, and dairies dominate the agricultural areas in the region. Agricultural fields commonly have irrigation canals, ditches, and stock ponds that serve as a water source or drainage for the fields and habitat for a variety of plants and animals.

The Project site also has riverine mapped on the Project site in an area that is currently active agricultural. There is no evidence of hydrology in this area, and the soils have been tested for hydric characteristics, which are not present. The source of the riverine mapping appears to be from dated GIS mapping from the USGS. Riverine habitat is not present on the Project site.

Hydrogeomorphic Features

The Project site is level agricultural property with agricultural roads and ancillary structures. There are no rivers, streams, or other aquatic habitats on the Project site. The agricultural fields are actively maintained in crops during the growing season.

SPECIAL-STATUS SPECIES

The following discussion is based on a background search of special-status species that are documented in the California Natural Diversity Database (CNDDB), the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants, and the U.S. Fish and Wildlife Service's (USFWS) records of listed endangered and threatened species from the IPAC database. The background search was regional in scope and focused on the documented occurrences within 10 miles of the Project site. Table 3.4-1 provides a list of special-status plants and Table 3.4-2 provides a list of special-status animals. Figure 3.4-1 and 3.4-1 present the documented occurrences within a one-mile and ten-mile radius of the Project site.

TABLE 3.4-1: SPECIAL-STATUS PLANT SPECIES WHICH MAY OCCUR IN PROJECT AREA

SPECIES	*STATUS (FED./CA/ CNPS/SJMSCP)*	*GEOGRAPHIC DISTRIBUTION*	*HABITAT AND BLOOMING PERIOD*	*PRESENCE DETERMINATION*
Big tarplant *Blepharizonia plumosa*	--/--/1B.1/No	San Francisco Bay area with occurrences in Alameda, Contra Costa, San Joaquin, Stanislaus, and Solano Counties	Valley and foothill grassland; 30-505 m. July-Oct.	Not Present
Slough thistle *Cirsium crassicaule*	--/--/1B.1/Yes	San Joaquin Valley: Kings, Kern, and San Joaquin Counties	Freshwater sloughs and marshes; 3-100 m. May-August.	Not Present
Recurved larkspur *Delphinium recurvatum*	--/--/1B.2/Yes	Central Valley from Colusa to Kern Counties	Alkaline soils in saltbush scrub, cismontane woodland, valley and foothill grassland; 3-750 m. March-May.	Not Present
Round-leaved filaree *Erodium macrophyllum*	--/--/2.1/No	Scattered occurrences in the Great Valley, southern north Coast Ranges, San Francisco Bay area, south Coast Ranges, Channel Islands, Transverse Ranges, and Peninsular Ranges	Cismontane woodland, valley and foothill grassland on clay soils; 15-1,200 m. March-May.	Not Present
Delta button-celery *Eryngium racemosum*	--/E/1B.1/Yes	San Joaquin River delta floodplains and adjacent Sierra Nevada foothills: Calaveras, Merced, San Joaquin, and Stanislaus Counties	Riparian scrub, seasonally inundated depressions along floodplains on clay soils; below 75 m. June-August.	Not Present
Wright's trichocoronis *Trichocoronis wrightii* var. *wrightii*	--/--/2.1/Yes	Scattered locations in the Central Valley; southern coast of Texas	Floodplains, moist places, on alkaline soils; below 450 m. May-September.	Not Present
Caper-fruited tropidocarpum *Tropidocarpum capparideum*	--/--/1B.1/Yes	Historically known from the northwest San Joaquin Valley and adjacent Coast Range foothills; currently known from Fresno, Monterey, and San Luis Obispo Counties	Alkaline hills in valley and foothill grassland; below 455 m. March-April.	Not Present

NOTES: *CNPS = CALIFORNIA NATIVE PLANT SOCIETY*
SJMSCP = SAN JOAQUIN MULTI-SPECIES HABITAT CONSERVATION AND OPEN SPACE PLAN

FEDERAL
E = ENDANGERED UNDER THE FEDERAL ENDANGERED SPECIES ACT.
T = THREATENED UNDER THE FEDERAL ENDANGERED SPECIES ACT.

STATE
E = ENDANGERED UNDER THE CALIFORNIA ENDANGERED SPECIES ACT.
T = THREATENED UNDER THE FEDERAL CALIFORNIA ENDANGERED SPECIES ACT.
R = RARE UNDER THE CALIFORNIA ENDANGERED SPECIES ACT

CALIFORNIA NATIVE PLANT SOCIETY
1B = RARE, THREATENED, OR ENDANGERED IN CALIFORNIA AND ELSEWHERE.
2 = RARE, THREATENED, OR ENDANGERED IN CALIFORNIA, BUT MORE COMMON ELSEWHERE.
3 = A REVIEW LIST – PLANTS ABOUT WHICH MORE INFORMATION IS NEEDED.
4 = PLANTS OF LIMITED DISTRIBUTION – A WATCH LIST
.1 = SERIOUSLY ENDANGERED IN CALIFORNIA (OVER 80% OF OCCURRENCES THREATENED-HIGH DEGREE AND IMMEDIACY OF THREAT).
.2 = FAIRLY ENDANGERED IN CALIFORNIA (20-80% OCCURRENCES THREATENED).
.3 = NOT VERY ENDANGERED IN CALIFORNIA (<20% OF OCCURRENCES THREATENED).

TABLE 3.4-2: SPECIAL-STATUS WILDLIFE AND FISH SPECIES WHICH MAY OCCUR IN PROJECT AREA

SPECIES	*STATUS (FED/CA/ SJMSCP)*	*GEOGRAPHIC DISTRIBUTION*	*HABITAT REQUIREMENTS*
INVERTEBRATES			
Vernal pool fairy shrimp *Branchinecta lynchi*	T/--/Yes	Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County. Isolated populations also in Riverside County	Common in vernal pools; they are also found in sandstone rock outcrop pools.
Vernal pool tadpole shrimp *Lepidurus packardi*	E/--/Yes	Shasta County south to Merced County	Vernal pools and ephemeral stock ponds.
Molestan blister beetle *Lytta molesta*	--/--/Yes	Distribution of this species is poorly known.	Annual grasslands, foothill woodlands or saltbush scrub.
Sacramento anthicid beetle *Anthicus sacramento*	--/--/No	Found in several locations along the Sacramento and San Joaquin rivers, from Shasta to San Joaquin counties, and at one site along the Feather River.	Sand dune area, sand slipfaces among bamboo and willow, but may not depend on these plants.
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	T/--/Yes	Stream side habitats below 3,000 feet throughout the Central Valley	Riparian and oak savanna habitats with elderberry shrubs; elderberries are the host plant.
AMPHIBIANS			
California tiger salamander *Ambystoma californiense (A. tigrinum c.)*	T/SSC/Yes	Central Valley, including Sierra Nevada foothills, up to approximately 1,000 feet, and coastal region from Butte County south to northeastern San Luis Obispo County.	Small ponds, lakes, or vernal pools in grass-lands and oak woodlands for larvae; rodent burrows, rock crevices, or fallen logs for cover for adults and for summer dormancy.
California red-legged frog *Rana aurora draytoni*	T/SSC/Yes	Found along the coast and coastal mountain ranges of California from Marin County to San Diego County and in the Sierra Nevada from Tehama County to Fresno County	Permanent and semi-permanent aquatic habitats, such as creeks and cold-water ponds, with emergent and submergent vegetation. May estivate in rodent burrows or cracks during dry periods.
BIRDS			
Aleutian goose *Branta canadensis leucopareia*	D/--/Yes	The entire population winters in Butte Sink, then moves to Los Banos, Modesto, the Delta, and East Bay reservoirs; stages near Crescent City during spring before migrating to breeding grounds.	Roosts in large marshes, flooded fields, stock ponds, and reservoirs; forages in pastures, meadows, and harvested grainfields; corn is especially preferred
American Peregrine Falcon *Falco peregrinus anatum*	D (BCC)/D/No	Patchy breeding distribution and occur across the continental U.S., with bigger concentrations taking place in the western states and Alaska. They winter in the northern limits of their range, including portions of Canada, and are very widespread during migration.	Near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures. Nest consists of a scrape or a depression or ledge in an open site.

SPECIES	*STATUS (FED/CA/ SJMSCP)*	*GEOGRAPHIC DISTRIBUTION*	*HABITAT REQUIREMENTS*
Bald eagle *Haliaeetus leucocephalus*	D (BCC)/E/No	Nests in Siskiyou, Modoc, Trinity, Shasta, Lassen, Plumas, Butte, Tehama, Lake, and Mendocino Counties and in the Lake Tahoe Basin. Reintroduced into central coast. Winter range includes the rest of California, except the southeastern deserts, very high altitudes in the Sierra Nevada, and east of the Sierra Nevada south of Mono County	In western North America, nests and roosts in coniferous forests within 1 mile of a lake, reservoir, stream, or the ocean
Burrowing owl *Athene cunicularia*	BCC/SSC/Yes	Lowlands throughout California, including the Central Valley, northeastern plateau, southeastern deserts, and coastal areas. Rare along south coast	Level, open, dry, heavily grazed or low stature grassland or desert vegetation with available burrows
California black rail *Laterallus jamaicensis coturniculus*	BCC/T/Yes	Permanent resident in the San Francisco Bay and east-ward through the Delta into Sacramento and San Joaquin Counties; small populations in Marin, Santa Cruz, San Luis Obispo, Orange, Riverside, and Imperial Counties	Tidal salt marshes associated with heavy growth of pickleweed; also occurs in brackish marshes or freshwater marshes at low elevations
Fox sparrow *Branta canadensis leucopareia*	BCC/--/No	Found throughout North American, with several subspecies wintering in chaparral in California.	Breed in thickets and chaparral across northern North America and south along the western mountains. During migration, Fox Sparrows forage in the leaf litter of open hardwood forests as well as swampy thickets. Winter in chaparral.
Least Bittern *Ixobrychus exilis*	BCC/SSC/No	Nest in large marshes with dense vegetation from southern Canada to northern Argentina. These birds migrate from the northern parts of their range in winter for the southernmost coasts of the United States and areas further south, travelling at night.	Colonial nester in marshlands and borders of ponds and reservoirs which provide ample cover. Nests usually placed low in tules, over water. Marsh & swamp wetland.
lesser yellowlegs *Branta canadensis leucopareia*	BCC/--/No	Wintering occurs along the coasts of California, Baja California, southeastern U.S., and along the Gulf of Mexico, in addition to southeastern Texas and throughout Central America.	Wintering habitat use varies with rainfall; tidal flats may be frequented during the dry season, while adjacent shallow lagoons and marshes are used during the rainy season.
lewis's woodpecker *Branta canadensis leucopareia*	BCC/--/No	Breed from southern British Columbia down to Arizona and New Mexico; this range also covers California east to Colorado. They winter from southern British Columbia throughout the southwestern U.S. Within the northern portion of its breeding range, it remains present throughout the year in many portions of its breeding range.	Open ponderosa pine forest, open riparian woodland dominated by cottonwood, and logged or burned pine forest. Their breeding distribution is widely associated with ponderosa pine distribution in western North America. Lewis's Woodpeckers commonly reuse existing nest holes or natural cavities in trees, as they do not use newly excavated ones.
Loggerhead shrike *Lanius ludovicianus*	BCC/SSC/Yes	Resident and winter visitor in lowlands and foothills throughout California. Rare on coastal slope north of Mendocino County, occurring only in winter	Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches
Long-billed curlew *Numenius americanus*	BCC/--/Yes	Nests in northeastern California in Modoc, Siskiyou, and Lassen Counties. Winters along the coast and in interior valleys west of Sierra Nevada	Nests in high-elevation grasslands adjacent to lakes or marshes. During migration and in winter; frequents coastal beaches and mudflats and interior grasslands and agricultural fields

SPECIES	*STATUS (FED/CA/ SJMSCP)*	*GEOGRAPHIC DISTRIBUTION*	*HABITAT REQUIREMENTS*
Marbeled godwit *Branta canadensis leucopareia*	BCC/--/No	Breeds in Montana as well as North and South Dakota, with this range extending through Alberta, Saskatchewan and Manitoba in Canada. Marbled Godwits winter along both coasts and the Gulf of Mexico and are transient elsewhere.	Breeds in marshes and flooded plains, in migration and winter also on mudflats and beaches.
Mountain plover *Charadrius montanus*	BCC/SSC/Yes	Does not breed in California; in winter, found in the Central Valley south of Yuba County, along the coast in parts of San Luis Obispo, Santa Barbara, Ventura, and San Diego Counties; parts of Imperial, Riverside, Kern, and Los Angeles Counties	Occupies open plains or rolling hills with short grasses or very sparse vegetation; nearby bodies of water are not needed; may use newly plowed or sprouting grainfields
Nuttalls woodpecker *Branta canadensis leucopareia*	BCC/--/No	Year-round distribution occurs from northern California and southward to northwestern Baja California.	Found primarily in oak woodlands, but also found in riparian woodlands. Tree nest cavity excavated by males with little assistance from females; male may roost in cavity as it nears completion.
Oak titmouse *Baeolophus inornatus*	BCC/S/No	Nonmigratory species that breeds from Oregon, through California and to northwest Baja California, Mexico.	Live in warm, open, dry oak or oak-pine woodlands. Many will use scrub oaks or other brush as long as woodlands are nearby. Nests are built in tree cavities. Occasionally, Oak Titmice nest in stumps, fenceposts, pipes, eaves, or holes in riverbanks. They will also use nest boxes.
Short-eared owl *Asio flammeus*	BCC/SSC/Yes	Permanent resident along the coast from Del Norte County to Monterey County although very rare in summer north of San Francisco Bay, in the Sierra Nevada north of Nevada County, in the plains east of the Cascades, and in Mono County; small, isolated populations	Freshwater and salt marshes, lowland meadows, and irrigated alfalfa fields; needs dense tules or tall grass for nesting and daytime roosts.
Song sparrow (Modesto Population) *Melospiza melodia*	BCC/SSC/Yes	Restricted to California, where it is locally numerous in the Sacramento Valley, Sacramento–San Joaquin River Delta, and northern San Joaquin Valley. Exact boundaries of range uncertain.	Found in emergent freshwater marshes dominated by tules (*Scirpus* spp.) and cattails (*Typha* spp.) as well as riparian willow (*Salix* spp.) thickets. They also nest in riparian forests of Valley Oak (*Quercus lobata*) with a sufficient understory of blackberry (*Rubus* spp.), along vegetated irrigation canals and levees, and in recently planted Valley Oak restoration sites.
Swainson's hawk *Buteo swainsoni*	BCC/T/Yes	Lower Sacramento and San Joaquin Valleys, the Klamath Basin, and Butte Valley. Highest nesting densities occur near Davis and Woodland, Yolo County	Nests in oaks or cottonwoods in or near riparian habitats. Forages in grasslands, irrigated pastures, and grain fields
Merlin *Falco columbarius*	--/--/Yes	Does not nest in California. Rare but widespread winter visitor to the Central Valley and coastal areas	Forages along coastline in open grasslands, savannas, and woodlands. Often forages near lakes and other wetlands
Tricolored blackbird *Agelaius tricolor*	BCC/C (SSC)/Yes	Permanent resident in the Central Valley from Butte County to Kern County. Breeds at scattered coastal locations from Marin County south to San Diego County; and at scattered locations in Lake, Sonoma, and Solano Counties. Rare nester in Siskiyou, Modoc, and Lassen Counties	Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles, and grainfields. Habitat must be large enough to support 50 pairs. Probably requires water at or near the nesting colony

SPECIES	*STATUS (FED/CA/ SJMSCP)*	*GEOGRAPHIC DISTRIBUTION*	*HABITAT REQUIREMENTS*
Western grebe *Branta canadensis leucopareia*	BCC/--/No	Breeds mainly from western Canada, east to southwestern Manitoba, and south through U.S. from California and Utah through the northern Rocky Mountain and upper Great Plains states. Winters mainly along Pacific Coast from southeastern Alaska to northwestern Mexico.	Breed on freshwater lakes and marshes with extensive open water bordered by emergent vegetation. During winter they move to saltwater or brackish bays, estuaries, or sheltered sea coasts and are less frequently found on freshwater lakes or rivers.
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	T (BCC)/E/Yes	Nests along the upper Sacramento, lower Feather, south fork of the Kern, Amargosa, Santa Ana, and Colorado Rivers	Wide, dense riparian forests with a thick understory of willows for nesting; sites with a dominant cottonwood overstory are preferred for foraging; may avoid valley oak riparian habitats where scrub jays are abundant
Williamson's sapsucker *Branta canadensis leucopareia*	BCC/--/No	Breeding: Southern British Columbia, through central Washington to California; extending to Idaho, Montana, Utah, Wyoming, Colorado, New Mexico and Arizona. Winter: Arizona, New Mexico, through the Sierra Madres and into central Mexico.	Inhabits open coniferous and mixed coniferous-deciduous forests.
Yellow-billed magpie *Pica nuttalli*	BCC/--/No	The year-round range of Yellow-billed Magpies is entirely in California.	Resides in oak savanna, open areas with large trees, and along streams. This species also forages in grassland, pasture, fields, and orchards.
Yellow-headed blackbird *Xanthocephalus xanthocephalus*	--/SSC/Yes	Nests in freshwater emergent wetlands with dense vegetation and deep water. Often along borders of lakes or ponds.	Nests only where large insects such as odonatan are abundant, nesting timed with maximum emergence of aquatic insects.
FISH			
Delta smelt *Hypomesus transpacificus*	T/T/Yes	Primarily in the Sacramento–San Joaquin Estuary but has been found as far upstream as the mouth of the American River on the Sacramento River and Mossdale on the San Joaquin River; range extends downstream to San Pablo Bay.	Occurs in estuary habitat in the Delta where fresh and brackish water mix in the salinity range of 2–7 parts per thousand.
Hardhead *Mylopharodon conocephalus*	--/SSC/No	Tributary streams in the San Joaquin drainage; large tributary streams in the Sacramento River and the main stem	Resides in low to mid-elevation streams and prefer clear, deep pools and runs with slow velocities. They also occur in reservoirs.
Central Valley steelhead *Oncorhynchus mykiss*	T/--/No	Sacramento River and tributary Central Valley rivers.	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 7.8°C to 18°C. Habitat types are riffles, runs, and pools.
Central Valley fall- /late fall-run Chinook salmon *Oncorhynchus tshawytscha*	--/SSC/No	Sacramento and San Joaquin Rivers and tributary Central Valley rivers.	Have the same general habitat requirements as winter and spring-run Chinook salmon.
Longfin smelt *Spirinchus thaleichthys*	--/SSC/Yes	Occurs in estuaries along the California coast. Adults concentrated in Suisun, San Pablo, and North San Francisco Bays.	Prior to spawning, these fish aggregate in deepwater habitats available in the northern Delta, including, primarily, the channel habitats of Suisun Bay and the Sacramento River. Spawning occurs in fresh water on the San Joaquin River below Medford Island and on the Sacramento River below Rio Vista.

SPECIES	STATUS (FED/CA/ SJMSCP)	GEOGRAPHIC DISTRIBUTION	HABITAT REQUIREMENTS
MAMMALS			
Riparian (San Joaquin Valley) woodrat *Neotoma fuscipes riparia*	E/SSC, FP/Yes	Historical distribution along the San Joaquin, Stanislaus, and Tuolumne Rivers, and Caswell State Park in San Joaquin, Stanislaus, and Merced Counties; presently limited to San Joaquin County at Caswell State Park and a possible second population near Vernalis	Riparian habitats with dense shrub cover, willow thickets, and an oak overstory
Riparian brush rabbit *Sylvilagus bachmani riparius*	E/E/Yes	Limited to San Joaquin County at Caswell State Park near the confluence of the Stanislaus and San Joaquin Rivers and Paradise Cut area on Union Pacific right-of-way lands	Native valley riparian habitats with large clumps of dense shrubs, low-growing vines, and some tall shrubs and trees
American badger *Taxidea taxus*	--/SSC/Yes	In California, badgers occur throughout the state except in humid coastal forests of northwestern California in Del Norte and Humboldt Counties	Badgers occur in a wide variety of open, arid habitats but are most commonly associated with grasslands, savannas, mountain meadows, and open areas of desert scrub; the principal habitat requirements for the species appear to be sufficient food (burrowing rodents), friable soils, and relatively open, uncultivated ground
San Joaquin kit fox *Vulpes macrotis mutica*	E/T/Yes	Principally occurs in the San Joaquin Valley and adjacent open foothills to the west; recent records from 17 counties extending from Kern County north to Contra Costa County	Saltbush scrub, grassland, oak, savanna, and freshwater scrub
REPTILES			
Giant garter snake *Thamnophis couchi gigas*	T/T/Yes	Central Valley from the vicinity of Burrel in Fresno County north to near Chico in Butte County; has been extirpated from areas south of Fresno	Sloughs, canals, low gradient streams and freshwater marsh habitats where there is a prey base of small fish and amphibians; they are also found in irrigation ditches and rice fields; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter.

STATUS EXPLANATIONS:

FEDERAL

E = ENDANGERED UNDER THE FEDERAL ENDANGERED SPECIES ACT.
T = THREATENED UNDER THE FEDERAL ENDANGERED SPECIES ACT.
PE = PROPOSED FOR ENDANGERED UNDER THE FEDERAL ENDANGERED SPECIES ACT.
PT = PROPOSED FOR THREATENED UNDER THE FEDERAL ENDANGERED SPECIES ACT.
C = CANDIDATE SPECIES FOR LISTING UNDER THE FEDERAL ENDANGERED SPECIES ACT.
D = DELISTED FROM FEDERAL LISTING STATUS.

STATE

E = ENDANGERED UNDER THE CALIFORNIA ENDANGERED SPECIES ACT.
T = THREATENED UNDER THE CALIFORNIA ENDANGERED SPECIES ACT.
FP = FULLY PROTECTED UNDER THE CALIFORNIA FISH AND GAME CODE.
SSC = SPECIES OF SPECIAL CONCERN IN CALIFORNIA.

3.4.2 REGULATORY SETTING

There are several regulatory agencies whose responsibility includes the oversight of the natural resources of the state and nation including the California Department of Fish and Wildlife (CDFW), USFWS, U.S. Army Corps of Engineers (USACE), and the Central Valley Regional Water Quality Control Board (CVRWQCB). These agencies often respond to declines in the quantity of a particular habitat or plant or animal species by developing protective measures for those species or habitat type. The following is an overview of the federal, state and local regulations that are applicable to the proposed Project.

FEDERAL

Federal Endangered Species Act

The Federal Endangered Species Act (FESA), passed in 1973, defines an endangered species as any species or subspecies that is in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as any species or subspecies that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Once a species is listed it is fully protected from a "take" unless a take permit is issued by the USFWS. A take is defined as the harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting wildlife species or any attempt to engage in such conduct, including modification of its habitat (16 USC 1532, 50 CFR 17.3). Proposed endangered or threatened species are those species for which a proposed regulation, but not a final rule, has been published in the Federal Register.

Migratory Bird Treaty Act

To kill, posses, or trade a migratory bird, bird part, nest, or egg is a violation of the Federal Migratory Bird Treaty Act (FMBTA: 16 U.S.C., §703, Supp. I, 1989), unless it is in accordance with the regulations that have been set forth by the Secretary of the Interior.

Federal Bald and Golden Eagle Protection Act

The Federal Bald and Golden Eagle Protection Act provide regulations to protect bald and golden eagles as well as their nests and eggs from willful damage or injury.

Clean Water Act – Section 404

Section 404 of the CWA regulates all discharges of dredged or fill material into waters of the U.S. Discharges of fill material includes the placement of fill that is necessary for the construction of any structure, or impoundment requiring rock, sand, dirt, or other material for its construction; site-development fills for recreational, industrial, commercial, residential, and other uses; causeways or road fills; and fill for intake and outfall pipes and subaqueous utility lines [33 C.F.R. §328.2(f)].

Waters of the U.S. include lakes, rivers, streams, intermittent drainages, mudflats, sandflats, wetlands, sloughs, and wet meadows. Wetlands are defined as "those areas that are inundated or

saturated by surface or groundwater at a frequency and duration sufficient to support and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" [33 C.F.R. §328.3(b)]. Waters of the U.S. exhibit a defined bed and bank and ordinary high water mark (OHWM). The OHWM is defined by the USACE as "that line on shore established by the fluctuations of water and indicated by physical character of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" [33 C.F.R. §328.3(e)].

The USACE is the agency responsible for administering the permit process for activities that affect waters of the U.S. Executive Order 11990 is a federal implementation policy, which is intended to result in no net loss of wetlands.

Clean Water Act – Section 401

Section 401 of the CWA (33 U.S.C. 1341) requires an applicant who is seeking a 404 permit to first obtain a water quality certification from the CVRWQCB. To obtain the water quality certification, the CVRWQCB must indicate that the proposed fill would be consistent with the standards set forth by the state.

Rivers and Harbors Act of 1899

The Rivers and Harbors Act prohibits the obstruction or alteration of any navigable water of the United States. The Act requires authorization from the USACE for any excavation or deposition of materials into these waters or for any work that could affect the course, location, condition, or capacity of rivers or harbors.

STATE

Fish and Game Code §2050-2097 – California Endangered Species Act

The California Endangered Species Act (CESA) protects certain plant and animal species when they are of special ecological, educational, historical, recreational, aesthetic, economic, and scientific value to the people of the State. CESA established that it is State policy to conserve, protect, restore, and enhance endangered species and their habitats.

CESA was expanded upon the original Native Plant Protection Act and enhanced legal protection for plants. To be consistent with Federal regulations, CESA created the categories of "threatened" and "endangered" species. It converted all "rare" animals into the Act as threatened species, but did not do so for rare plants. Thus, there are three listing categories for plants in California: rare, threatened, and endangered. Under State law, plant and animal species may be formally designated by official listing by the California Fish and Game Commission.

Fish and Game Code §1900-1913 – California Native Plant Protection Act

In 1977 the State Legislature passed the Native Plant Protection Act (NPPA) in recognition of rare and endangered plants of the state. The intent of the law was to preserve, protect, and enhance endangered plants. The NPPA gave the California Fish and Game Commission the power to designate

native plants as endangered or rare, and to require permits for collecting, transporting, or selling such plants. The NPPA includes provisions that prohibit the taking of plants designated as "rare" from the wild, and a salvage mandate for landowners, which requires notification of the CDFW 10 days in advance of approving a building site.

Fish and Game Code §3503, 3503.5, 3800 – Predatory Birds

Under the California Fish and Game Code, all predatory birds in the order Falconiformes or Strigiformes in California, generally called “raptors,” are protected. The law indicates that it is unlawful to take, posses, or destroy the nest or eggs of any such bird unless it is in accordance with the code. Any activity that would cause a nest to be abandoned or cause a reduction or loss in a reproductive effort is considered a take. This generally includes construction activities.

Fish and Game Code §1601-1603 – Streambed Alteration

Under the California Fish and Game Code, CDFW has jurisdiction over any proposed activities that would divert or obstruct the natural flow or change the bed, channel, or bank of any lake or stream. Private landowners or project proponents must obtain a “Streambed Alteration Agreement” from CDFW prior to any alteration of a lake bed, stream channel, or their banks. Through this agreement, the CDFW may impose conditions to limit and fully mitigate impacts on fish and wildlife resources. These agreements are usually initiated through the local CDFW warden and will specify timing and construction conditions, including any mitigation necessary to protect fish and wildlife from impacts of the work.

Public Resources Code §21000 – California Environmental Quality Act

CEQA identifies that a species that is not listed on the federal or state endangered species list may be considered rare or endangered if the species meets certain criteria. (CEQA Guidelines § 15380) Species that are not listed under FESA or CESA, but are otherwise eligible for listing (i.e. candidate, or proposed) may be protected by the local government until the opportunity to list the species arises for the responsible agency.

Species that may be considered for review are included on a list of “Species of Special Concern,” developed by the CDFW. Additionally, the California Native Plant Society (CNPS) maintains a list of plant species native to California that have low populations, limited distribution, or are otherwise threatened with extinction. This information is published in the Inventory of Rare and Endangered Vascular Plants of California. List 1A contains plants that are believed to be extinct. List 1B contains plants that are rare, threatened, or endangered in California and elsewhere. List 2 contains plants that are rare, threatened, or endangered in California, but more numerous elsewhere.

California Wetlands Conservation Policy

In August 1993, the Governor announced the "California Wetlands Conservation Policy.” The goals of the policy are to establish a framework and strategy that will:

- Ensure no overall net loss and to achieve a long-term net gain in the quantity, quality, and permanence of wetland acreage and values in California in a manner that fosters creativity, stewardship, and respect for private property.
- Reduce procedural complexity in the administration of State and federal wetland conservation programs.
- Encourage partnerships to make landowner incentive programs and cooperative planning efforts the primary focus of wetland conservation and restoration.

The Governor also signed Executive Order W-59-93, which incorporates the goals and objectives contained in the new policy and directs the Resources Agency to establish an Interagency Task Force to direct and coordinate administration and implementation of the policy.

Natural Community Conservation Planning Act

The Natural Community Conservation Planning Act provides long-term protection of species and habitats through regional, multi-species planning before the special measures of the CESA become necessary.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act authorizes the SWRCB to regulate state water quality and protect beneficial uses.

Water Quality Control Plan for the Sacramento-San Joaquin River Basins

The Water Quality Control Plan for the Sacramento-San Joaquin River Basins (Basin Plan), adopted by the CVRWQCB in 1998, identifies the beneficial uses of water bodies and provides water quality objectives and standards for waters of the Sacramento River and SJR basins, including the Delta.

State and federal laws mandate the protection of designated "beneficial uses" of water bodies. State law defines beneficial uses as "domestic; municipal; agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves" (Water Code Section 13050[f]). Additional protected beneficial uses of the SJR include groundwater recharge and fresh water replenishment. Major issues and the general conditions of existing beneficial uses in the SJR are as follows:

- Water Supply: The SJR is not currently a source of municipal water supply for the City of Manteca and is not identified as a source for the proposed Project, although some farms in the region use the river as a source of water for irrigation. The City currently uses groundwater only and surface water from the South San Joaquin Irrigation District (SSJID) South County Surface Water Supply Project (SCSWSP), which does not rely on the SJR.
- Agricultural Supply: Extensive use is made of SJR and Delta waters for agricultural purposes. Annual water diversions from the Delta by the State Water Project (SWP) and the Central Valley Project (CVP) for agriculture are estimated to reach 4.3 million acre-feet (MAF) per year by 2030. In addition, about 2,000 privately owned agricultural water supply diversions are scattered throughout the Delta, generally consisting of riverside pumping stations.

- Recreation: Water-dependent recreation uses of the SJR and the Delta include swimming, wading, waterskiing, sport fishing, and a variety of other activities that involve contact with the water. Noncontact (water-enhanced) recreation uses include picnicking, camping, pleasure boating, hunting, bird watching, education, and aesthetic enjoyment.
- Groundwater Recharge: Water from the SJR and the Delta recharges the San Joaquin Valley groundwater basin. Recharge serves to maintain salt balance in the soil column, prevent saltwater intrusion into freshwater aquifers, and provide for water supplies. Groundwater is replenished through deep percolation of streamflow, precipitation, and applied irrigation water. Groundwater quality is generally adequate throughout the San Joaquin Valley and the Delta, although at shallow depths within the Delta the water is often saline and contains high levels of total dissolved solids (TDS) and dissolved minerals. Enforceable TDS standards do not exist for drinking water. The need for treatment generally depends on consumer acceptance.
- Fish and Wildlife: The SJR and the waterways of the Delta provide important habitat for a diverse variety of aquatic life and terrestrial wildlife. This includes temporary habitat and migration routes for anadromous and other migratory species, as well as permanent habitat for resident species. Fish dependent on the Delta as a migration corridor, nursery, or permanent residence include Chinook salmon, steelhead, delta smelt, Sacramento splittail, striped bass, American shad, sturgeon, catfish, largemouth bass, and numerous other estuary and freshwater species. The amount and quality of water flowing through the Delta greatly influences the overall productivity of the area on an annual basis. A large assemblage of wildlife uses the Delta either seasonally or year round, including waterfowl; migratory and resident songbirds; mice, rabbits, and other small mammals; water dependent mammals, such as beaver and muskrat; and predators such as skunk, raccoon, northern harrier, and coyote.

LOCAL

San Joaquin County Multi-Species Habitat Conservation and Open Space Plan

A Habitat Conservation Plan (HCP) is a federal planning document that is prepared pursuant to Section 10 of the FESA. An approved HCP within a defined plan area allows for the incidental take of species and habitat that are otherwise protected under FESA during development activities.

A Natural Community Conservation Plan (NCCP) is a state planning document administered by CDFW. An approved NCCP within a defined plan area allows for the incidental take of species and habitat that are otherwise protected under CESA during growth and development activities.

Background: The key purpose of the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP), is to provide a strategy for balancing the need to conserve Open Space and the need to Convert Open Space to non-Open Space uses while protecting the region's agricultural economy; preserving landowner property rights; providing for the long-term management of plant, fish and wildlife species, especially those that are currently listed, or may be listed in the future, under the Federal Endangered Species Act (ESA) or the California Endangered

Species Act (CESA); providing and maintaining multiple-use Open Spaces which contribute to the quality of life of the residents of San Joaquin County; and accommodating a growing population while minimizing costs to Project Proponents and society at large.

San Joaquin County's past and future (2001-2051) growth has affected and will continue to affect 97 special status plant, fish and wildlife species in 52 vegetative communities scattered throughout San Joaquin County's 1,400+ square miles and 900,000+ acres, which include 43% of the Sacramento-San Joaquin Delta's Primary Zone. The SJMSCP, in accordance with ESA Section 10(a)(1)(B) and CESA Section 2081(b) Incidental Take Permits, provides compensation for the Conversion of Open Space to non-Open Space uses which affect the plant, fish and wildlife species covered by the Plan, hereinafter referred to as "SJMSCP Covered Species". In addition, the SJMSCP provides some compensation to offset the impacts of open space land conversions on non-wildlife related resources such as recreation, agriculture, scenic values and other beneficial Open Space uses.

The SJMSCP compensates for Conversions of Open Space for the following activities: urban development, mining, expansion of existing urban boundaries, non-agricultural activities occurring outside of urban boundaries, levee maintenance undertaken by the San Joaquin Area Flood Control Agency, transportation projects, school expansions, non-federal flood control projects, new parks and trails, maintenance of existing facilities for non-federal irrigation district projects, utility installation, maintenance activities, managing Preserves, and similar public agency projects. These activities will be undertaken by both public and private individuals and agencies throughout San Joaquin County and within the County's incorporated cities of Escalon, Manteca, Lodi, Manteca, Ripon, Stockton and Tracy. Public agencies including Caltrans (for transportation projects), and the San Joaquin Council of Governments (for transportation projects) also will undertake activities which will be covered by the SJMSCP. In addition, 5,340 acres is allocated for anticipated projects (e.g., annexations, general plan amendments)

The 97 SJMSCP Covered Species include 25 state and/or federally listed species. The SJMSCP Covered Species include 27 plants (6 listed), 4 fish (2 listed), 4 amphibians (1 listed), 4 reptiles (1 listed), 33 birds (7 listed), 15 mammals (3 listed) and 10 invertebrates (5 listed).

Implementation: The SJMSCP is administered by a Joint Powers Authority consisting of members of the San Joaquin County Council of Governments (SJCOG), the CDFW, and the USFWS. Development project applicants are given the option of participating in the SJMSCP as a way to streamline compliance with required local, State and federal laws regarding biological resources, and typically avoid having to approach each agency independently. According to the SJMSCP, adoption and implementation by local planning jurisdictions provides full compensation and mitigation for impacts to plants, fish and wildlife. Adoption and implementation of the SJMSCP also secures compliance pursuant to the state and federal laws such as CEQA, the National Environmental Policy Act (NEPA), the Planning and Zoning Law, the State Subdivision Map Act, the Porter-Cologne Act and the Cortese-Knox Act in regard to species covered under the SJMSCP.

Applicants pay mitigation fees on a per-acre basis, as established by the Joint Powers Authority according to the measures needed to mitigate impacts to the various habitat and biological

resources. Different types of land require different levels of mitigation; i.e., one category requires that one acre of a similar land type be preserved for each acre developed, while another type requires that two acres be preserved for each acre developed. The entire County is mapped according to these categories so that land owners, project proponents and project reviewers are easily aware of the applicable SJMSCP fees for the proposed development.

The appropriate fees are collected by the City and remitted to SJCOG for administration. SJCOG uses the funds to preserve open space land of comparable types throughout the County, often coordinating with other private or public land trusts to purchase conservation easements or buy land outright for preservation. Development occurring on land that has been classified under the SJMSCP as "no-pay" would not be required to pay a fee. This category usually refers to already urbanized land and infill development areas. Although the fees are automatically adjusted on an annual basis, based on the construction cost index, they often cannot keep pace with the rapidly rising land prices in the Central Valley.

City of Manteca General Plan

POLICIES: AGRICULTURAL RESOURCES

- RC-P-31. Minimize impact of new development on native vegetation and wildlife.
- RC-P-32. Condition new development in the vicinity of the San Joaquin River and Walthall Slough to protect riparian habitat, wetlands, and other native vegetation and wildlife communities and habitats.
- RC-P-33. Discourage the premature removal of orchard trees in advance of development, and discourage the removal of other existing healthy mature trees, both native and introduced.
- RC-P-34. Protect special status species and other species that are sensitive to human activities.
- RC-P-35. Allow contiguous habitat areas.
- RC-P-36. Consider the development of new drainage channels planted with native vegetation, which would provide habitat as well as drainage.

IMPLEMENTATION: BIOLOGICAL RESOURCES

- RC-I-32. Continue to support and comply with the requirements of the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP) when reviewing proposed public and private land use changes.
- RC-I-33. Project proponents who opt not to participate in the SJMSCP shall:
    - Satisfy applicable U.S. Endangered Species Act (ESA), California Endangered Species Act (CESA), National Environmental Policy Act (NEPA), California Environmental Quality Act (CEQA), and other applicable local, state, and federal laws and regulation provisions through consultations with the Permitting Agencies and local planning agencies.
    - Provide site-specific research and ground surveys for proposed development projects. This research must include a detailed inventory of all biological resources onsite, and appropriate mitigation measures for avoiding or reducing impact to these biological

resources. This requirement may be waived if determined by the City that the proposed project area is already sufficiently surveyed.

- RC-I-34. Until such time that a Clean Water Act regional general permit or its equivalent is issued for coverage under the SJMSCP, acquisition of a Section 404 permit by project proponents will continue to occur as required by existing regulations. Project proponents shall comply with all requirements for protecting federally protected wetlands.
- RC-I-35. Continue to enforce the City's heritage tree ordinance which defines and identifies mature trees to be protected, and establishes regulations for their protection and removal.
- RC-I-36. Limit the access of pedestrians and bicyclists to wetland areas so that access is compatible with long-term protection of these natural resources.
- RC-I-37. The City shall implement multiple use of resource areas, where feasible, that includes passive recreational and educational opportunities with the protection of wildlife and vegetation habitat areas.

City of Manteca Municipal Code

The Manteca Municipal Code calls for the avoidance of heritage trees. Heritage trees are defined under section 17.61.030 of the code as any natural woody plant rooted in the ground and having a diameter of 30 inches or more when measured two feet above the ground. Section 17.19.060 calls for the protection of all existing trees having a diameter of six inches or more when measured 4½ feet above the ground. The City planning department must be notified of planned construction or grade changes within the proximity of existing mature trees. Existing trees must be protected from construction equipment, machinery, grade changes, and excavation for utilities, paving, and footers. Replacement of existing trees is subject to approval from the planning director and must be with a minimum 24-inch box tree of compatible species for the development site and be consistent with Section 17.19.030. Orchard areas of one acre or more are exempt from section 17.19.060(A); however, as outlined above, policy RC-P-33 of the City's General Plan discourages the premature removal of orchard trees in advance of development.

Section 12.08.070 of the Municipal Code prohibits cutting, pruning, removing, injuring, or interference with any tree, shrub, or plant upon or in any street tree area or other public place in the City without prior approval from the superintendent. The City is authorized to grant such permission at their discretion and where necessary. Except for utility companies, as provided in Section 12.08.080, no such permission shall be valid for a longer period than 30 days after its issuance.

3.4.3 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the proposed Project will have a significant impact on biological resources if it will:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional

plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;

- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance;
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

IMPACTS AND MITIGATION

Impact 3.4-1: The proposed Project has the potential to have a direct or indirect effect on special-status invertebrate species. (Less than Significant)

There are three special-status invertebrates that are documented within a 10-mile radius of the Project site according to the CNDDB including: Molestan blister beetle (*Lytta molesta*), Sacramento anthicid beetle (*Anthicus sacramento*), and valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*). In addition, the Vernal pool fairy shrimp (*Branchinecta lynchi*) and Vernal pool tadpole shrimp (*Lepidurus packardi*) are documented in the USFWS IPAC database as potentially occurring within the region.

The valley elderberry longhorn beetle, vernal pool fairy shrimp, and vernal pool tadpole shrimp are covered species under the SJMCP. Field surveys and habitat evaluations for the entire Project site were performed on May 10, and June 28, 2016.

Valley elderberry longhorn beetle (VELB) is a federal threatened insect, proposed for delisting. Elderberry (*Sambucus* sp.), which is a primary host species for valley elderberry longhorn beetle (VELB), is not present within the Project site. VELB is not anticipated to be directly affected by any individual phase or component of the proposed Project because there are no blue elderberry shrubs in the Project site.

Vernal pool fairy shrimp (VPFS) is a federal threatened invertebrate found in the Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County. They are commonly found in vernal pools and in sandstone rock outcrop pools. VPFS is not anticipated to be directly affected by any individual phase or component of the proposed Project because there in not appropriate vernal pool habitat on the Project site.

Vernal pool tadpole shrimp (VPTS) is a federal endangered invertebrate found in vernal pools and stock ponds from Shasta county south to Merced county. VPTS is not anticipated to be directly affected by any individual phase or component of the proposed Project because there in not appropriate vernal pool habitat on the Project site.

Essential habitat for Molestan blister beetle and Sacramento anthicid beetle is not present on the Project site.

No special-status invertebrates were observed within the Project site or offsite improvement corridors during field surveys and none are expected to be affected by the proposed Project. Therefore, the proposed Project would have a **less than significant** impact on special-status invertebrate species.

MITIGATION MEASURE(S)

Mitigation Measure 3.4-1*: Prior to commencement of any grading activities, the Project proponent shall seek coverage under the SJMSCP to mitigate for habitat impacts to covered special status species. Coverage involves compensation for habitat impacts on covered species through implementation of incidental take and minimization Measures (ITMMs) and payment of fees for conversion of lands that may provide habitat for covered special status species. These fees are used to preserve and/or create habitat in preserves to be managed in perpetuity. Obtaining coverage for a Project includes incidental take authorization (permits) under the Endangered Species Act Section 10(a), California Fish and Game Code Section 2081, and the MBTA. Coverage under the SJMSCP would fully mitigate all habitat impacts on covered special-status species.*

Impact 3.4-2: The proposed Project has the potential to have direct or indirect effects on special-status reptile and amphibian species. (Less than Significant)

There is one special-status amphibian that is documented within a 10-mile radius of the Project site according to the CNDDB including: California tiger salamander (*Ambystoma californiense*). In addition, the California red-legged frog (*Rana aurora draytoni*) and Giant garter snake (*Thamnophis couchi gigas*) are documented in the USFWS IPAC database as potentially occurring within the region. There is no essential habitat for any of these three species within any phase of the Project.

No special-status reptiles or amphibians were observed within the Project site or offsite improvement corridors during field surveys and none are expected to be affected by the proposed Project. Therefore, the proposed Project would have a **less than significant** impact on special status reptile or amphibian species.

Impact 3.4-3: The proposed Project has the potential to have direct or indirect effects on special-status bird species. (Less than Significant)

Special-status birds that are documented in the CNDDB within a ten-mile radius of the Project site include: Aleutian goose (*Branta canadensis leucopareia*), Yellow-headed blackbird (*Xanthocephalus xanthocephalus*), Swainson's hawk (*Buteo swainsoni*), song sparrow (Modesto population)

(*Melospiza melodia*), Merlin (*Falco columbarius*), western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), burrowing owl (*Athene cunicularia*), Tricolored blackbird (*Agelaius tricolor*). In addition, the bald eagle (*Haliaeetus leucocephalus*), black rail (*Laterallus jamaicensis*), fox sparrow (*Passerella iliaca*), least bittern (*Ixobrychus exilis*), lesser yellowlegs (*Tringa flavipes*), Lewis's woodpecker (*Melanerpes lewis*), loggerhead shrike (*Lanius ludovicianus*), long-billed curlew (*Numenius americanus*), marbeled godwit (*Limosa fedoa*), mountain plover (*Charadrius montanus*), Nuttalls woodpecker (*Picoides nuttallii*), oak titmouse (*Baeolophus inornatus*), peregrine falcon (*Falco peregrinus*), short-eared owl (*Asio flammeus*), western grebe (A*echmophorus occidentalis*), Williamson's sapsucker (*Sphyrapicus thyroideus*), and yellow-billed magpie (*Pica nuttalli*) are documented in the USFWS IPAC database as potentially occurring within the region. The Project site may provide suitable foraging habitat for a variety of potentially occurring special-status birds, including those listed above. Potential nesting habitat is present in a variety of trees located within the Project site and in the vicinity. There is also the potential for other special-status birds that do not nest in this region and represent migrants or winter visitants to forage on the Project site.

Year-round birds: Special-status birds that can be present in the region throughout the year include: bald eagle (*Haliaeetus leucocephalus*), black rail (*Laterallus jamaicensis*), burrowing owl (*Athene cunicularia*), loggerhead shrike *(Lanius ludovicianus*), Nuttalls woodpecker (*Picoides nuttallii*), oak titmouse (*Baeolophus inornatus*), song sparrow (Modesto population) (*Melospiza melodia*), tricolored blackbird *(Agelaius tricolor*), Williamson's sapsucker (*Sphyrapicus thyroideus*), yellow-billed magpie (*Pica nuttalli*), among others. Some of these species are migratory, but also reside year-round in California.

Summering Birds: Special-status birds that are only present in the region in the spring and summer months include: Aleutian goose (*Branta canadensis leucopareia*), least bittern (*Ixobrychus exilis*), Swainson's hawk (*Buteo swainsoni*), western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), and yellow-billed magpie (*Pica nuttalli*).

Overwintering Birds: Special-status birds that are only present in the region in the fall and winter months include: fox sparrow (*Passerella iliaca*), lesser yellowlegs (*Tringa flavipes*), Lewis's woodpecker (*Melanerpes lewis*), long-billed curlew (*Numenius americanus*), marbeled godwit (*Limosa fedoa*), merlin *(Falco columbarius*), mountain plover (*Charadrius montanus*), peregrine falcon (*Falco peregrinus*), short-eared owl (*Asio flammeus*), and western grebe (A*echmophorus occidentalis*).

Nesting Raptors (Birds of Prey): All raptors (owls, hawks, eagles, falcons), including species and their nests, are protected from take pursuant to the Fish and Game Code of California Section 3503.5, and the federal Migratory Bird Treaty Act, among other federal and State regulations. Special-status raptors that are known to occur in the region include: bald eagle (*Haliaeetus leucocephalus*), burrowing owl (*Athene cunicularia*), Cooper's hawk *(Accipiter cooperii*), ferruginous hawk *(Buteo rega*), golden eagle *(Aquila chrysaetos*), great horned owl *(Bubo virginianus),* prairie falcon *(Falco mexicanus*), red-tailed hawk *(Buteo jamaicensis),* short-eared owl (*Asio flammeus*), Swainson's hawk *(Buteo swainsoni*), and white-tailed kite *(Elanus leucurus*), among others.

Analysis: Powerlines and trees located in the region represent potentially suitable nesting habitat for a variety of special-status birds. Additionally, the agricultural land represents potentially suitable nesting habitat for the ground-nesting birds. In general, most nesting occurs from late February and early March through late July and early August, depending on various environmental conditions. The CNDDB currently contains nesting records for Swainson's hawk and burrowing owl in the vicinity of the Project site. In addition to the species described above, common raptors such as among others, may nest in or adjacent to the Project site.

New sources of noise and light during the construction and operational phases of the Project could adversely affect nesters if they located adjacent to the Project site in any given year. Additionally, the proposed Project would eliminate the agricultural areas on the Project site, which serve as potential foraging habitat for birds throughout the year. Mitigation Measure 3.4-1 requires participation in the SJMSCP. As part of the SJMSCP, SJCOG requires preconstruction surveys for projects that occur during the avian breeding season (March 1 – August 31). When active nests are identified, the biologists develop buffer zones around the active nests as deemed appropriate until the young have fledged. SJCOG also uses the fees to purchase habitat as compensation for the loss of foraging habitat. Implementation of the proposed Project, with the Mitigation Measure 3.4-1, would ensure that potential impacts to special status birds are reduced to a **less than significant** level.

Impact 3.4-4: The proposed Project has the potential to result in direct or indirect effects on special-status mammal species. (Less than Significant)

Special-status mammals that are documented within a 10-mile radius of the Project site include: Riparian (San Joaquin Valley) woodrat (*Neotoma fuscipes riparia*), Riparian brush rabbit (*Sylvilagus bachmani riparius*), American badger (*Taxidea taxus*), and San Joaquin kit fox (*Vulpes macrotis mutica*).

Riparian (San Joaquin Valley) woodrat and riparian brush rabbit: The Project site does not contain appropriate habitat for riparian (San Joaquin Valley) woodrat and riparian brush rabbit. These species were not observed during the field surveys and have not been documented on the Project site. Based on field surveys these species are not present. Therefore, the proposed Project would have a **less than significant** impact on this special-status species.

American badger, San Joaquin kit fox, or San Joaquin pocket mouse: The Project site is frequently disturbed from active agricultural activities. As a result, the Project site does not contain high quality habitat for the American badger. All but one of the documented occurrences of the San Joaquin kit fox occur on the southwest side of Tracy near the foothills with one documented occurrence located near Mountain House. The closest documented occurrence of San Joaquin pocket mouse is approximately five miles west of the Project site. It is unlikely that the Project site is used by American badger, San Joaquin kit fox, or San Joaquin pocket mouse and these species have not been observed during recent or previous field surveys. Therefore, the proposed Project would have a **less than significant** impact on these species.

Special-status bats: The Project site provides potential habitat for several special-status bats, including: Greater western mastiff bat (*Eumops perotis californicus*), western red bat (*Lasiurus blossevillii*), small-footed myotis/bat (*Myotis ciliolabrum*), long-eared myotis/bat (*Myotis evotis*), fringed myotis/bat (*Myotis thysanodes*), long-legged myotis/bat (*Myotis volans*), and Yuma myotis/bat (*Myotis yumanensis*). These species are not federal or state listed; however, they are tracked by the CNDDB.

Development of the Project site would eliminate foraging habitat for special status bats by removing the agricultural areas. These special status bat species are covered by the SJMSCP.

These special status bat species were not observed during the field surveys and have not been documented on the Project site; therefore, they are not expected to be directly affected. Implementation of Mitigation Measure 3.4-1 would provide compensation for the loss of the potential foraging habitat. Therefore, the proposed Project would have a **less than significant** impact on special status bat species.

Impact 3.4-5: The proposed Project has the potential for direct or indirect effects on candidate, sensitive, or special-status plant species. (Less than Significant)

The records search identified seven documented special-status plant species within a 10 mile radius of the Project site. These seven special status plants include: Big tarplant (*Blepharizonia plumose*), Slough thistle (*Cirsium crassicaule*), Recurved larkspur (*Delphinium recurvatum*), Round-leaved filaree (*Erodium macrophyllum*), Delta button-celery (*Eryngium racemosum*), Wright's trichocoronis (*Trichocoronis wrightii var. wrightii*), and Caper-fruited tropidocarpum (*Tropidocarpum capparideum*).

Of the seven documented species, there are no federal listed species, one state listed species (endangered), five CNPS 1B listed species (including the state listed species), and two CNPS 2 listed species. The state listed species and CNPS 1B listed species are covered species under the SJMCP. The CNPS 2 listed species are not covered under the SJMCP.

Field surveys and habitat evaluations were performed on May 10, and June 28, 2016. The collection of field surveys included surveys that coincided with the blooming period for special many status plants known to occur within the region. The conditions of the Project site are highly disturbed due to the active agricultural operations. No special-status plants were observed within the Project site during field surveys. The surveys were conducted within the blooming period for all species. Implementation of the individual phases, and the proposed Project as a whole, will have a **less than significant** impact on special status plants.

Impact 3.4-6: The proposed Project has the potential to effect protected wetlands and jurisdictional waters. (Less than Significant with Mitigation)

There is an irrigation basin/ditch located within the portion of the Project that was part of the Oakwood Trails Project. The irrigation basin is a man-made ditch that functions to drain upland agricultural runoff. A wetland delineation and permit applications have been submitted to the

USACE (404), CDFW (1600), and RWQCB (401) to request authorization for fill through the Oakwood Trails Project (see wetland delineation in the Appendix G). The wetland delineation refers to the portion of the ditch that is within the proposed Project boundary as Irrigation Ditch #4. This ditch is 0.24 acres and is approximately 712.2 feet long. The Project applicant must consult with the USACE to ensure that the regulatory agency authorizes the proposed fill activities of Irrigation Ditch #4. There are no other wetlands that are proposed for disturbance. Implementation of the following Mitigation Measure would ensure that this impact is reduced to a **less than significant** level.

MITIGATION MEASURES

Mitigation Measure 3.4-2*: Prior to any construction activities that would disturb the irrigation basin (Irrigation Ditch #4 from Oakwood Trails), the Project applicant shall obtain authorization for fill from the regulatory agencies (USACE-404 permit, RWQCB-401 certification, 1600 Streambed Alteration Agreement). All requirements of a permit shall be adhered to throughout the construction phase.*

Impact 3.4-7: The proposed Project has the potential to result in adverse effects on riparian habitat or a sensitive natural community. (Less than Significant)

The CNDDB record search revealed documented occurrences of four sensitive habitats within 10 miles of the Project site including: Elderberry Savanna, Great Valley Cottonwood Riparian Forest, Great Valley Mixed Riparian Forest, and Great Valley Oak Riparian. None of these sensitive natural communities occur within the portion of the Project site. Implementation of the proposed Project would have a **less than significant** impact on riparian habitats or natural communities.

Impact 3.4-8: The proposed Project has the potential to result in interference with the movement of native fish or wildlife species or with established wildlife corridors, or impede the use of native wildlife nursery sites. (Less than Significant)

The CNDDB record search did not reveal any documented wildlife corridors or wildlife nursery sites on or adjacent to the Project site. Special status fish species documented within the region include: Delta smelt (*Hypomesus transpacificus*), Hardhead (*Mylopharodon conocephalus*), Central Valley steelhead (*Oncorhynchus mykiss*), Central Valley fall- /late fall-run Chinook salmon (*Oncorhynchus tshawytscha*), and Longfin smelt (*Spirinchus thaleichthys*). The closest major natural movement corridor for native fish that are documented in the region is the San Joaquin River, located to the west of the Project site. There are also SSJID irrigation canals that run through Manteca that are known to have native fish enter the canal system approximately 11 miles north of Manteca at the French Camp Slough. Specifically, Central Valley fall- /late fall-run Chinook salmon (*Oncorhynchus tshawytscha*) and known to exist in the SSJID canals.

The land uses within the Project site would not have any direct disturbance to the San Joaquin River or its tributaries, and therefore, would not have any direct disturbance to the movement corridor or habitat.

The ongoing operational phase of the proposed Project requires discharge of stormwater into the City storm drainage system, which ultimately discharges into the Delta. The discharge of stormwater could result in indirect impacts to special status fish and wildlife if stormwater was not appropriately treated through BMPs prior to its discharge to the Delta. The Manteca Municipal Code Title 13 (Public Services) Chapter 13.28 (Stormwater Management and Discharges) establish minimum storm water management requirements and controls. Storm water drainage is managed through the implementation of best management practices to the extent they are technologically achievable to prevent and reduce pollutants. The City requires reasonable protection from accidental discharge of prohibited materials or other wastes into the municipal storm drain system or watercourses. The management of water quality through BMPs is intended to ensure that water quality does not degrade to levels that would interfere or impede fish or wildlife. Implementation of these required measures would ensure that this potential impact is reduced to a **less than significant** level.

Impact 3.4-9: The proposed Project has the potential to conflict with an adopted Habitat Conservation Plan. (Less than Significant)

The proposed Project is subject to the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP). The proposed Project does not conflict with the SJMSCP. Therefore, the proposed Project would have a **less than significant** impact relative to this topic. Mitigation Measure 3.4-1 requires participation in the SJMSCP.

Impact 3.4-10: The proposed Project has the potential to conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. (Less than Significant)

The Resource Conservation Element of the General Plan establishes numerous policies and implementation measures related to biological resources as listed below:

Conservation Element Policies

RC-P-31. Minimize impact of new development on native vegetation and wildlife.

- ***Consistent****: This EIR includes an in depth analysis of impacts for sensitive plants and wildlife, as well as habitat. Where impacts are identified, mitigation measures are presented to minimize, avoid, or compensate to the extent practicable.*

RC-P-33. Discourage the premature removal of orchard trees in advance of development, and discourage the removal of other existing healthy mature trees, both native and introduced.

- ***Consistent****: The proposed Project will not require the removal of orchard trees*

RC-P-34. Protect special status species and other species that are sensitive to human activities.

- ***Consistent****: This EIR includes an in depth analysis of impacts for sensitive plants and wildlife, as well as habitat. Where impacts are identified, mitigation measures are presented to minimize, avoid, or compensate to the extent practicable.*

RC-P-35. Allow contiguous habitat areas.

- ***Consistent**: Habitat areas in the vicinity of the Project site include largely agricultural plant communities which provide habitat for a variety of biological resources in the region. Agricultural areas occur throughout the region and are generally flat and well drained, and as a result are well suited for many crops. Alfalfa fields, hay, row crops, orchards, dominate the agricultural areas in the vicinity. The proposed Project does not require contiguous habitat areas to change or convert to another use.*

RC-P-36. Consider the development of new drainage channels planted with native vegetation, which would provide habitat as well as drainage.

- ***Consistent**: The Project does not include new drainage channels.*

Municipal Code

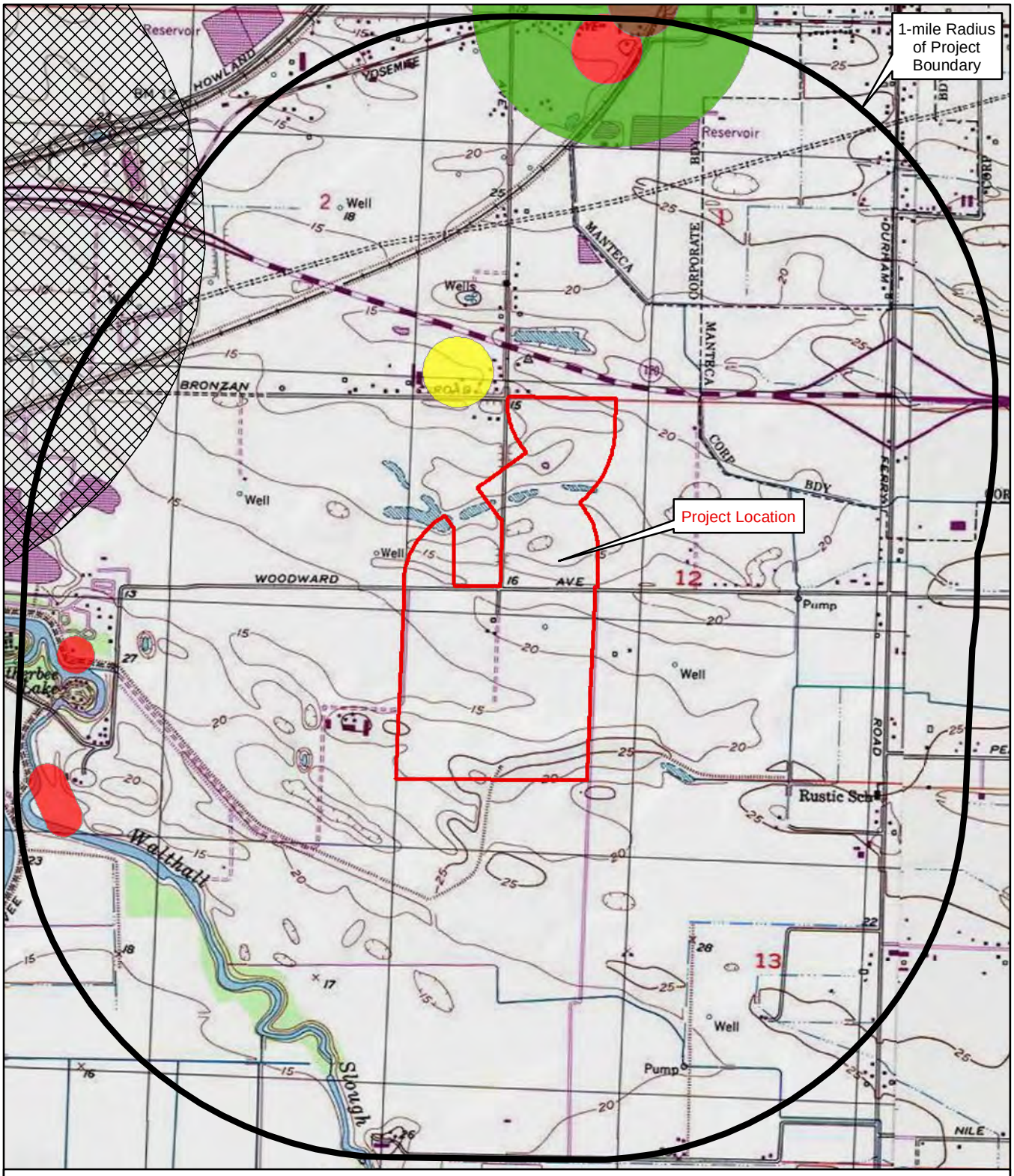
The Manteca Municipal Code calls for the avoidance of heritage trees as defined under section 17.61.030. Heritage trees are any natural woody plant rooted in the ground and having a diameter of 30 inches or more when measured two feet above the ground. There are no heritage trees on the Project site.

Section 17.19.060 calls for the protection of all existing trees having a diameter of six inches or more when measured 4½ feet above the ground. The City planning department must be notified of planned construction or grade changes within the proximity of existing mature trees. Existing trees must be protected from construction equipment, machinery, grade changes, and excavation for utilities, paving, and footers. Replacement of existing trees is subject to approval from the planning director and must be with a minimum 24-inch box tree of compatible species for the development site and be consistent with Section 17.19.030. There are no trees that meet this requirement on the Project site.

Section 12.08.070 of the municipal code prohibits cutting, pruning, removing, injuring, or interference with any tree, shrub, or plant upon or in any street tree area or other public place in the City without prior approval from the superintendent. The City is authorized to grant such permission at their discretion and where necessary. Except for utility companies, as provided in Section 12.08.080, no such permission shall be valid for a longer period than 30 days after its issuance. There are no trees that meet this requirement on the Project site.

Implementation of the proposed Project would have a **less than significant** impact relative to this topic.

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Legend

- California tiger salamander
- Swainson's hawk
- burrowing owl
- tricolored blackbird
- Area of Multiple Species Occurrence:
  - Delta button-celery
  - western bumble bee

0 500 1,000

Feet

1:24,000

OAKWOOD LANDING

Figure 3.4-1: California Natural Diversity Database

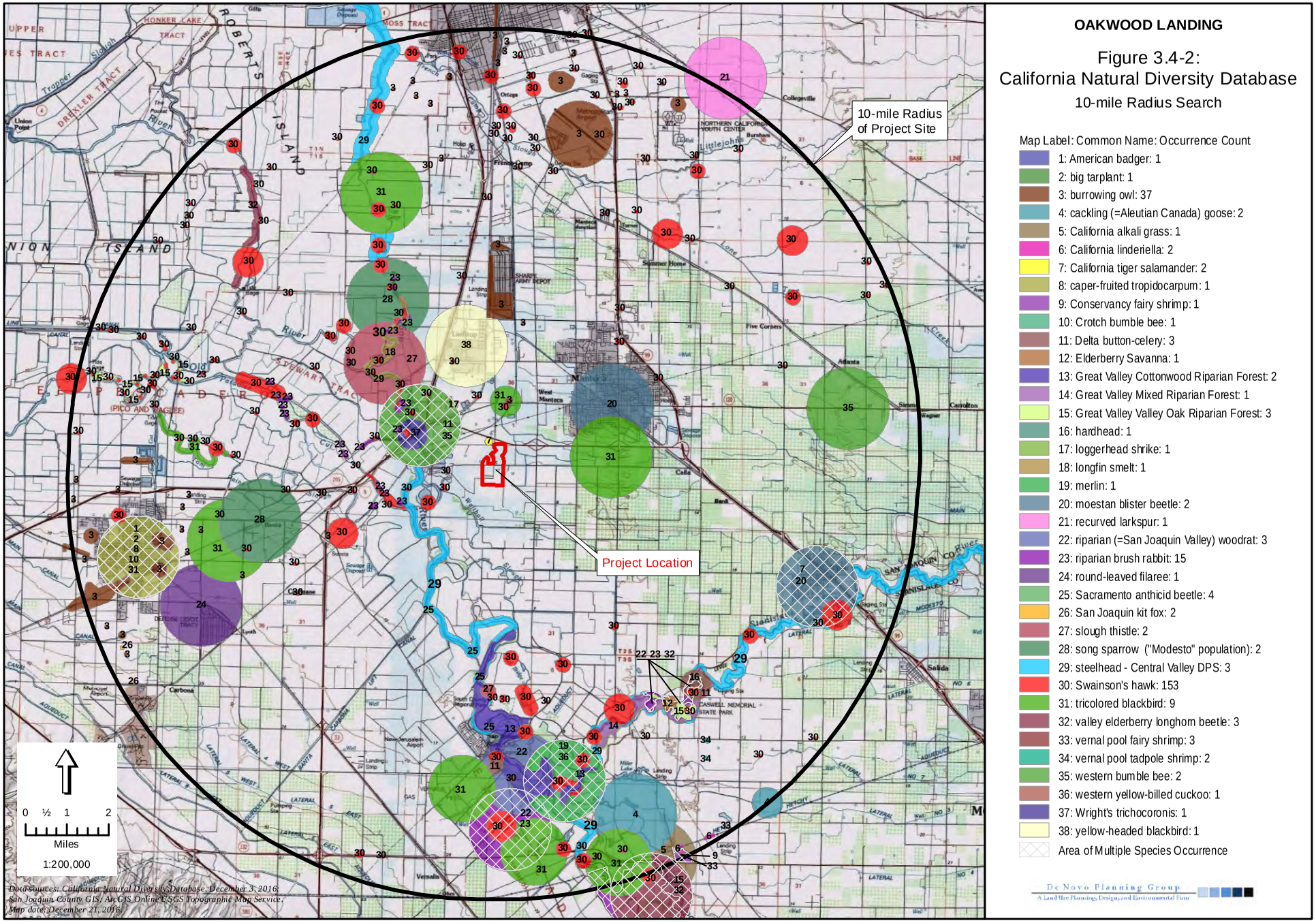
1-mile Radius Search

Data sources: California Natural Diversity Database, December 3, 2016; San Joaquin County GIS; ArcGIS Online USGS Topographic Map Service. Map date: December 21, 2016.

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OAKWOOD LANDING
Figure 3.4-2:
California Natural Diversity Database
10-mile Radius Search
10-mile Radius of Project Site
Project Location
Map Label: Common Name: Occurrence Count
1: American badger: 1
2: big tarplant: 1
3: burrowing owl: 37
4: cackling (=Aleutian Canada) goose: 2
5: California alkali grass: 1
6: California linderiella: 2
7: California tiger salamander: 2
8: caper-fruited tropidocarpum: 1
9: Conservancy fairy shrimp: 1
10: Crotch bumble bee: 1
11: Delta button-celery: 3
12: Elderberry Savanna: 1
13: Great Valley Cottonwood Riparian Forest: 2
14: Great Valley Mixed Riparian Forest: 1
15: Great Valley Valley Oak Riparian Forest: 3
16: hardhead: 1
17: loggerhead shrike: 1
18: longfin smelt: 1
19: merlin: 1
20: moestan blister beetle: 2
21: recurved larkspur: 1
22: riparian (=San Joaquin Valley) woodrat: 3
23: riparian brush rabbit: 15
24: round-leaved filaree: 1
25: Sacramento anthicid beetle: 4
26: San Joaquin kit fox: 2
27: slough thistle: 2
28: song sparrow ("Modesto" population): 2
29: steelhead - Central Valley DPS: 3
30: Swainson's hawk: 153
31: tricolored blackbird: 9
32: valley elderberry longhorn beetle: 3
33: vernal pool fairy shrimp: 3
34: vernal pool tadpole shrimp: 2
35: western bumble bee: 2
36: western yellow-billed cuckoo: 1
37: Wright's trichocoronis: 1
38: yellow-headed blackbird: 1
Area of Multiple Species Occurrence
0 ½ 1 2
Miles
1:200,000
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Data Sources: California Natural Diversity Database, December 3, 2016;
San Joaquin County GIS; ArcGIS Online USGS Topographic Map Service.
Map date: December 21, 2016.

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This section provides a discussion of the prehistoric period background, ethnographic background, historic period background, known cultural resources in the region, regulatory setting, impact analysis, and mitigation measures. Information in this section is derived primarily from the *Cultural Resource Assessment for the Oakwood Landing Project, City of Manteca, San Joaquin County, California* (Peak & Associates, Inc., November 2016).

3.5.1 ENVIRONMENTAL SETTING

PROJECT SETTING

The Project site is located in the southwestern portion of the City of Manteca city limits. The Project site is immediately southeast of the intersection of Bronzan Road and McKinley Avenue. The Project site is bounded on the north by an existing dirt roadway between Bronzan Road and Atherton Drive, on the east by South McKinley Avenue and an existing residential subdivision, on the south by existing agricultural fields, and on the west by existing agricultural fields and the future Atherton Drive right-of-way. The Project site is located within Sections 11 and 12 of Township 2 South, Range 6 East MDBM. The Project site is shown on the Lathrop, California, 7.5-minute series quadrangle map.

CULTURAL AND HISTORICAL SETTING

Prehistory

The Central Valley region was among the first in the State to attract intensive fieldwork, and research has continued to the present day. This has resulted in a substantial accumulation of data.

In the early decades of the 1900s, E.J. Dawson explored numerous sites near Stockton and Lodi, later collaborating with W.E. Schenck (Schenck and Dawson 1929). By 1933, the focus of work was directed to the Cosumnes locality, where survey and excavation studies were conducted by the Sacramento Junior College (Lillard and Purves 1936). Excavation data, in particular from the stratified Windmiller site (CA-Sac-107), suggested two temporally distinct cultural traditions. Later work at other mounds by the Sacramento Junior College and the University of California, Berkeley, enabled the investigators to identify a third cultural tradition, intermediate between the previously postulated Early and Late Horizons. The three-horizon sequence, based on discrete changes in ornamental artifacts and mortuary practices, as well as on observed differences in soils within sites (Lillard, Heizer and Fenenga 1939), was later refined by Beardsley (1954). An expanded definition of artifacts diagnostic of each time period was developed, and its application extended to parts of the central California coast. Traits held in common allow the application of this system within certain limits of time and space to other areas of prehistoric central California.

The Windmiller Culture (Early Horizon) is characterized by ventrally-extended burials (some dorsal extensions are known), with westerly orientation of heads; a high percentage of burials with grave goods; frequent presence of red ocher in graves; large projectile points, of which 60 percent are of materials other than obsidian; rectangular *Haliotis* beads; *Olivella* shell beads (types A1a and L);

rare use of bone; some use of baked clay objects; and well-fashioned charmstones, usually perforated.

The Cosumnes Culture (Middle Horizon) displays considerable changes from the preceding cultural expression. The burial mode is predominately flexed, with variable cardinal orientation and some cremations present. During the Middle Horizon, there is a lower percentage of burials with grave goods, and ocher staining is common in graves. *Olivella* beads of types C1, F and G predominate, and there is abundant use of green *Haliotis* sp. rather than red *Haliotis* sp. Other characteristic artifacts include perforated and canid teeth; asymmetrical and "fishtail" charmstones, usually unperforated; cobble mortars and evidence of wooden mortars; extensive use of bone for tools and ornaments; large projectile points, with considerable use of rock other than obsidian; and use of baked clay.

The Hotchkiss Culture (Late Horizon) burial pattern retains the use of the flexed mode. There is wide spread evidence of cremation, and lesser use of red ocher, heavy sue of baked clay, *Olivella* beads of Types E and M, extensive use of *Haliotis* ornaments of many elaborate shapes and forms, shaped mortars and cylindrical pestles, bird-bone tubes with elaborate geometric designs, clam shell disc beads, small projectile points indicative of the introduction of the bow and arrow, flanged tubular pipes of steatite and schist, and use of magnesite (Moratto 1984:181-183). The characteristics noted are not all-inclusive, but cover the more important traits.

Schulz (1981), in an extensive examination of the central California evidence for the use of acorns, used the terms Early, Middle and Late Complexes, but the traits attributed to them remain generally the same. While it is not altogether clear, Schulz seemingly uses the term “Complex” to refer to the particular archeological entities (above called “Horizons”) as defined in this region. Ragir's (1972) cultures are the same as Schulz's complexes.

Bennyhoff and Hughes (1984) have presented alternative dating schemes for the Central California Archeological Sequence. The primary emphasis is a more elaborate division of the horizons to reflect what is seen as cultural/temporal changes within the three horizons and a compression of the temporal span.

There have been other chronologies proposed, including Fredrickson (1973), and since it is correlated with Bennyhoff's (1977) work, it does merit discussion. The particular archeological cultural entities Fredrickson has defined, based upon the work of Bennyhoff, are patterns, phases and aspects. Bennyhoff's (1977) work in the Plains Miwok area is the best definition of the Cosumnes District, which likely conforms to Fredrickson's pattern. Fredrickson also proposed periods of time associated heavily with economic modes, which provides a temporal term for comparing contemporary cultural entities. It corresponds with Willey and Phillips' (1958) earlier “tradition”, although it is tied more specifically to the archeological record in California.

Ethnography

The Project site lies within the northern portion of the ethnographic territory of the Yokuts people. The Yokuts were members of the Penutian language family which held all of the Central Valley, San Francisco Bay Area, and the Pacific Coast from Marin County to near Point Sur. The Yokuts differed from other ethnographic groups in California as they had true tribal divisions with group names (Kroeber 1925; Latta 1949). Each tribe spoke a particular dialect, common to its members, but similar enough to other Yokuts that they were mutually intelligible (Kroeber 1925).

The Yokuts held portions of the San Joaquin Valley from the Tehachapis in the south to Stockton in the north. On the north, they were bordered by the Plains Miwok, and on the west by the Saclan or Bay Miwok and Costonoan peoples. Although neighbors were often from distinct language families, differences between the people appear to have been more influenced by environmental factors as opposed to linguistic affinities. Thus, the Plains Miwok were more similar to the nearby Yokuts than to foothill members of their own language group. Similarities in cultural inventory co-varied with distance from other groups and proximity to culturally diverse people. The material culture of the southern San Joaquin Yokuts was therefore more closely related to that of their non-Yokuts neighbors than to that of Delta members of their own language group.

Trade was well developed, with mutually beneficial interchange of needed or desired goods. Obsidian, rare in the San Joaquin Valley, was obtained by trade with Paiute and Shoshoni groups on the eastern side of the Sierra Nevada, where numerous sources of this material are located, and to some extent from the Napa Valley to the north. Shell beads, obtained by the Yokuts from coastal people, and acorns, rare in the Great Basin, were among many items exported to the east by Yokuts traders (Davis 1961).

Economic subsistence was based on the acorn, with substantial dependency on gathering and processing of wild seeds and other vegetable foods. The rivers, streams, and sloughs that formed a maze within the valley provided abundant food resources such as fish, shellfish, and turtles. Game, wild fowl, and small mammals were trapped and hunted to provide protein augmentation of the diet. In general, the eastern portion of the San Joaquin Valley provided a lush environment of varied food resources, with the estimated large population centers reflecting this abundance (Cook 1955; Baumhoff 1963).

Settlements were oriented along the water ways, with their village sites normally placed adjacent to these features for their nearby water and food resources. House structures varied in size and shape (Latta 1949; Kroeber 1925), with most constructed from the readily available tules found in the extensive marshes of the low-lying valley areas. The housepit depressions for the structures ranged in diameter from 3 meters to 18 meters (Wallace 1978:470).

Historical Background

The first extensive wheat-growing in the San Joaquin Valley took place on the sand plains in the region between Stockton and Manteca and on the west side of the valley between Tracy and Newman. The wheat growing was due to an initial experiment of John Wheeler Jones, who planted 160 acres of wheat in 1855 which included the central town site of what is now Manteca. He

plowed his fields with a walking plow. The famous Stockton gang-plow was reported to be invented near the present site of Manteca (Smith 1960: 221, 243).

When the railroad was completed through the San Joaquin Valley, a shipping point was set up in the region and named Cowell for Joshua Cowell, who had donated the right of way for the railroad. The station was re-named Manteca in 1904 or 1905 by the Southern Pacific for a local creamery that had taken its name from the Spanish word for "butter" or "lard" (Gudde 1969: 191).

Reviewing historical maps, the land of the Project site had been taken up by three owners by 1862, each of whom held 320 acres or more. The Project site remained a portion of a large holding, suggesting use for dry land farming.

The first U.S. Geological Survey (USGS) topographic map for the area (Lathrop 1914) shows the Walthall Slough Dry Land Levee crossing the Project site. In 1917, virtually all of the land was owned by the Lathrop Alfalfa Land Company, and the site was likely used for the production of alfalfa. The site has remained in agricultural use, with gradual subdivision of lots into smaller parcels.

METHODOLOGY

Records Search

Records of previously recorded cultural resources and cultural resource investigations were examined by the Central California Information Center of the California Historical Resources Information System on June 24, 2016 for the Project site (CCIC File # 9846L), and surrounding one quarter mile radius. Their report indicates that several portions of the Project site have been subject to several minor linear cultural resource surveys, and several cultural resource overviews. Other surveys have been conducted within one quarter mile of the Project site.

The Walthall Slough Dry Land Levee on the south end of the Project area has been recorded, and is not an eligible resource. A residence near the Project site has also been recorded, and evaluated as not significant. No prehistoric period resources have ever been recorded in or in the immediate vicinity of the Project site.

Field Survey

The Project site was subject to a complete survey in July 2016 by Mike Lawson and Robert Gerry, covering the area with transects no wider than 20 meters. Most of the Project site is in cultivation. The ground surface within the Project site was inspected for artifacts, midden or any other indication of site presence. The ground surface, though heavily disturbed by previous agricultural work, was easily visible in all areas due to tillage, mowing and spacing of plants. There were no significant impediments to surface visibility.

The soil was consistently sandy, light brown loam in each field. Little or no stone was noted in the soil and no color changes were apparent.

As noted previously, the Walthall Slough Dry Land Levee has been recorded, and is not an eligible resource. A frame storage shed with a corrugated metal roof is located just south of the junction of McKinley Avenue and Woodward Avenue. There is also a concrete watering trough near the shed and both are contained in an unplanted, disturbed area 200 feet by 140 feet in size. Map study indicates that this area was a small farm headquarters in 1952 with two residences and a barn, apparently constructed after 1915. The site has been recorded by Robert Gerry, and does not appear to be an important or significant resource.

3.5.2 REGULATORY SETTING

FEDERAL

National Historic Preservation Act

The National Historic Preservation Act was enacted in 1966 as a means to protect cultural resources that are eligible to be listed on the National Register of Historic Places (NRHP). The law sets forth criterion that is used to evaluate the eligibility of cultural resources. The NRHP is composed of districts, sites, buildings, structures, objects, architecture, archaeology, engineering, and culture that are significant to American History.

Virtually any physical evidence of past human activity can be considered a cultural resource. Although not all such resources are considered to be significant and eligible for listing, they often provide the only means of reconstructing the human history of a given site or region, particularly where there is no written history of that area or that period. Consequently, their significance is judged largely in terms of their historical or archaeological interpretive values. Along with research values, cultural resources can be significant, in part, for their aesthetic, educational, cultural and religious values.

National Register of Historic Places

The eligibility criteria for the NRHP are as follows (36 CFR 60.4):

> *The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess aspects of integrity of location, design, setting, materials, workmanship, feeling, association, and*
>
> *(A) that are associated with events that have made a significant contribution to the broad patterns of our history and cultural heritage; or*
> *(B) that are associated with the lives of persons significant in our past; or*
> *(C) that embody the distinctive characteristics of a type, period, region, or method of construction, or that represent the work of a master, or that possess high artistic values or that represent a significant and distinguishable entity whose components may lack individual distinction; or*

(D) that have yielded, or may be likely to yield, information important in prehistory or history.

STATE

California Register of Historic Resources

The California Register of Historical Resources (CRHR) was established in 1992 and codified in the Public Resource Code §5020, 5024 and 21085. The law creates several categories of properties that may be eligible for the CRHR. Certain properties are included in the program automatically, including: properties listed in the NRHP; properties eligible for listing in the NRHP; and certain classes of State Historical Landmarks. Determining the CRHR eligibility of historic and prehistoric properties is guided by Covenants Conditions and Restrictions (CCR) §§15064.5(b) and Public Resources Code (PRC) §§21083.2 and 21084.1.

Cultural resources, under CRHR guidelines, are defined as buildings, sites, structures, or objects that may have historical, architectural, archaeological, cultural, or scientific importance. A cultural resource may be eligible for listing on the CRHR if it:

- is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
- is associated with the lives of persons important in our past;
- embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual or possesses high artistic values; or
- has yielded, or may be likely to yield, information important in prehistory or history.

California Environmental Quality Act

The California Environmental Quality Act (CEQA) Guidelines §15064.5 provides guidance for determining the significance of impacts to archaeological and historical resources. Demolition or material alteration of a historical resource, including archaeological sites, is generally considered a significant impact. Determining the CRHR eligibility of historic and prehistoric properties is guided by CCR §§15064.5(b) and PRC §§21083.2 and 21084.1.

CEQA also provides for the protection of Native American human remains (CCR §15064.5[d]). Native American human remains are also protected under the Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001 et seq.), which requires federal agencies and certain recipients of federal funds to document Native American human remains and cultural items within their collections, notify Native American groups of their holdings, and provide an opportunity for repatriation of these materials. This act also requires plans for dealing with potential future collections of Native American human remains and associated funerary objects, sacred objects, and objects of cultural patrimony that might be uncovered as a result of development projects overseen or funded by the federal government.

If a prehistoric or historic period cultural resource does not meet any of the four CRHR criteria, but does meet the definition of a "unique" site as outlined in PRC §21083.2, it may still be treated as a significant resource if it is: an archaeological artifact, object or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- it contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information,
- it has a special and particular quality such as being the oldest of its type or the best available example of its type, or
- it is directly associated with a scientifically recognized important prehistoric or historic event.

Assembly Bill 978

In 2001, Assembly Bill (AB) 978 expanded the reach of Native American Graves Protection and Repatriation Act of 1990 and established a state commission with statutory powers to assure that federal and state laws regarding the repatriation of Native American human remains and items of patrimony are fully complied with. In addition, AB 978 also included non-federally recognized tribes for repatriation.

Assembly Bill 52

AB 52, approved in September 2014, creates a formal role for California Native American tribes by creating a formal consultation process and establishing that a substantial adverse change to a tribal cultural resource has a significant effect on the environment. Tribal cultural resources are defined as:

1) Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following:

   A) Included or determined to be eligible for inclusion in the CRHR

   B) Included in a local register of historical resources as defined in PRC Section 5020.1(k)

2) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in PRC Section 5024.1 (c). In applying the criteria set forth in PRC Section 5024.1 (c) the lead agency shall consider the significance of the resource to a California Native American tribe.

A cultural landscape that meets the criteria above is also a tribal cultural resource to the extent that the landscape is geographically defined in terms of the size and scope of the landscape. In addition, a historical resource described in PRC Section 21084.1, a unique archaeological resource as defined in PRC Section 21083.2(g), or a "non-unique archaeological resource" as defined in PRC Section 21083.2(h) may also be a tribal cultural resource if it conforms with above criteria.

AB 52 requires a lead agency, prior to the release of a negative declaration, mitigated negative declaration, or environmental impact report for a project, to begin consultation with a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project if: (1) the California Native American tribe requested to the lead agency, in writing, to be informed by the lead agency through formal notification of proposed projects in the geographic area that is traditionally and culturally affiliated with the tribe, and (2) the California Native American tribe responds, in writing, within 30 days of receipt of the formal notification, and requests the consultation.

LOCAL

City of Manteca General Plan

POLICIES: CULTURAL RESOURCES

- RC-P-37: The City shall not knowingly approve any public or private project that may adversely affect an archaeological site without consulting the California Archaeological Inventory at Stanislaus State University, conducting a site evaluation as may be indicated, and attempting to mitigate any adverse impacts according to the recommendation of a qualified archaeologist. City implementation of this policy shall be guided by the California Environmental Quality Act (CEQA) and the National Historic Preservation Act (NHPA).
- RC-P-38: The City shall require that the proponent of any development proposal in an area with potential archaeological resources, and specifically near the San Joaquin River and Walthall Slough, and on the east side of State Highway 99 at the Louise Avenue crossing, shall consult with the California Archaeological Inventory, Stanislaus State University to determine the potential for discovery of cultural resources, conduct a site evaluation as may be indicated, and mitigate any adverse impacts according to the recommendation of a qualified archaeologist. The survey and mitigation shall be developer funded.
- RC-P-39: The City shall set as a priority the protection and enhancement of Manteca's historically and architecturally significant buildings.
- RC-P-40: The City shall work with property owners seeking registration of historical structures as Historic Landmarks or listing on the Register of Historic Sites.
- RC-P-41: The City shall prepare and adopt a Historical Preservation Ordinance.
- RC-P-42: The City and Redevelopment Agency shall support the efforts of property owners to preserve and renovate historic and architecturally significant structures. Where such buildings cannot be preserved intact, the City shall seek to preserve the building facades.

3.5.3 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the proposed Project is considered to have a significant impact on cultural resources if it will:

- Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines §15064.5;

- Cause a substantial adverse change in the significance of archaeological resource pursuant to CEQA Guidelines §15064.5;
- Directly or indirectly destroy a unique paleontological resource;
- Disturb any human remains, including those interred outside of formal cemeteries;
- Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code §21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:
    - Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k); or
    - A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resources to a California Native American tribe.

IMPACTS AND MITIGATION MEASURES

Impact 3.5-1: Project implementation has the potential to cause a substantial adverse change to a significant historical resource, as defined in CEQA Guidelines §15064.5, or a significant tribal cultural resource, as defined in Public Resources Code §21074. (Less than Significant with Mitigation)

The Project site is located in an area known to have historical resources. The field surveys did not reveal a significant historical resource or site on the Project site. However, as with most projects in the region that involve ground-disturbing activities, there is the potential for discovery of a previously unknown historical resource or tribal cultural resource. The implementation of the following mitigation measure would ensure that this potential impact is **less than significant**.

MITIGATION MEASURE(S)

Mitigation Measure 3.5-1: *If any cultural resources, including prehistoric or historic artifacts, or other indications of archaeological resources are found during grading and construction activities, all work shall be halted immediately within a 200-foot radius of the discovery until an archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards in prehistoric or historical archaeology, as appropriate, has evaluated the find(s).*

Work shall not continue at the discovery site until the archaeologist conducts sufficient research and data collection to make a determination that the resource is either 1) not cultural in origin; or 2) not potentially significant or eligible for listing on the NRHP or CRHR; or 3) not a significant Public Trust Resource.

If Native American resources are identified, a Native American monitor, following the Guidelines for Monitors/Consultants of Native American Cultural, Religious, and Burial Sites established by the Native American Heritage Commission, may also be required and, if required, shall be retained at the Applicant's expense.

Impact 3.5-2: Project implementation has the potential to cause a substantial adverse change to a significant archaeological resource, as defined in CEQA Guidelines §15064.5. (Less than Significant with Mitigation)

The Project site is located in an area known to have cultural resources. Although three residences have been recorded, the field surveys did not reveal a significant archeological resource or site on the Project site. However, as with most projects in the region that involve ground-disturbing activities, there is the potential for discovery of previously unknown cultural resources or human remains. The implementation of the following mitigation measure would ensure that this potential impact is **less than significant**.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.5-1**.*

Impact 3.5-3: Project implementation has the potential to directly or indirectly destroy a unique paleontological resource. (Less than Significant with Mitigation)

The field surveys by did not reveal any surface evidence of paleontological resources on the Project site. The Project site is not expected to contain subsurface paleontological resources, although it is possible.

Damage to or destruction of a paleontological resource would be considered a potentially significant impact under local, State, or federal criteria. Implementation of the following mitigation measure would ensure steps would be taken to reduce impacts to paleontological resources in the event that they are discovered during construction. This mitigation measure would reduce this impact to a ***less than significant*** level.

MITIGATION MEASURE(S)

Mitigation Measure 3.5-2: *If paleontological resources are discovered during the course of construction, work shall be halted immediately within 50 meters (165 feet) of the discovery, the City of Manteca shall be notified, and a qualified paleontologist shall be retained to determine the significance of the discovery. If the paleontological resource is considered significant, it should be excavated by a qualified paleontologist and given to a local agency, State University, or other applicable institution, where they could be curated and displayed for public education purposes.*

Impact 3.5-4: Project implementation has the potential to disturb human remains, including those interred outside of formal cemeteries. (Less than Significant with Mitigation)

Indications are that humans have occupied San Joaquin County for over 10,000 years and it is not always possible to predict where human remains may occur outside of formal burials. Therefore, excavation and construction activities, regardless of depth, may yield human remains that may not be interred in marked, formal burials.

Under CEQA, human remains are protected under the definition of archaeological materials as being "any evidence of human activity." Additionally, PRC Section 5097 has specific stop-work and notification procedures to follow in the event that human remains are inadvertently discovered during Project implementation.

While no human remains were found during field surveys, implementation of the following mitigation measure would ensure that all construction activities that inadvertently discover human remains implement State-required consultation methods to determine the disposition and historical significance of any discovered human remains. The following mitigation measure would reduce this impact to a ***less than significant*** level.

MITIGATION MEASURE(S)

Mitigation Measure 3.5-3: *If human remains are discovered during the course of construction, work shall be halted at the site and at any nearby area reasonably suspected to overlie adjacent human remains until the San Joaquin County Coroner has been informed and has determined that no investigation of the cause of death is required. If the remains are of Native American origin, either of the following steps shall be taken:*

- *The coroner shall contact the Native American Heritage Commission in order to ascertain the proper descendants from the deceased individual. The coroner shall make a recommendation to the landowner or the person responsible for the excavation work, for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods, which may include obtaining a qualified archaeologist or team of archaeologists to properly excavate the human remains.*
- *The landowner shall retain a Native American monitor, and an archaeologist, if recommended by the Native American monitor, and rebury the Native American human remains and any associated grave goods, with appropriate dignity, on the property and in a location that is not subject to further subsurface disturbance when any of the following conditions occurs:*
    - *The Native American Heritage Commission is unable to identify a descendent.*
    - *The descendant identified fails to make a recommendation.*
    - *The City of Manteca or its authorized representative rejects the recommendation of the descendant, and the mediation by the Native American Heritage Commission fails to provide measures acceptable to the landowner.*

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The purpose of this section is to disclose and analyze the potential impacts associated with the geology of the Project site and regional vicinity, and to analyze issues such as the potential exposure of people and property to geologic hazards, landform alteration, and erosion. Additionally, this section will include a discussion of the potential impacts associated with mineral resources. This section is based in part on the following: *City of Manteca General Plan 2023* (City of Manteca as amended through 2013), *Manteca General Plan 2023 Draft Environmental Impact Report* (City of Manteca, 2003), *Custom Soils Report for San Joaquin County, California* (NRCS, 2016), Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS, 2016), Interactive Fault Map provided by the U.S. Geological Survey (USGS, 2015), *Special Report 199 Update of Mineral Land Classification for Portland Cement Concrete-Grade Aggregate in the Stockton-Lodi Production-Consumption Region, San Joaquin and Stanislaus Counties, California* (California Geological Survey, 2012), and *San Joaquin County General Plan Background Report – Natural Resources* (San Joaquin County, July 2009). There were no comments received during the NOP scoping process related to this environmental topic.

3.6.1 ENVIRONMENTAL SETTING

GEOLOGIC SETTING

Regional Geology

The Project site lies in the San Joaquin Valley in central California. The San Joaquin Valley is located in the southern portion of the Great Valley Geomorphic Province. The Great Valley, also known as the Central Valley, is a topographically flat, northwest-trending, structural trough (or basin) about 50 miles wide and 450 miles long. It is bordered by the Tehachapi Mountains on the south, the Klamath Mountains on the north, the Sierra Nevada on the east, and the Coast Ranges on the west.

The San Joaquin Valley (Valley) is filled with thick sedimentary rock sequences that were deposited as much as 130 million years ago. Large alluvial fans have developed on each side of the Valley. The larger and more gently sloping fans are on the east side of the Valley, and overlie metamorphic and igneous basement rocks. These basement rocks are exposed in the Sierra Nevada foothills and consist of meta-sedimentary, volcanic, and granitic rocks.

Local Setting

The Project site is relatively flat with natural gentle slope from north to south. The Project site topography ranges in elevation from approximately 20 to 30 feet above sea level. Figure 2.0-3 in Section 2.0 shows the Topographic view of the Project site. The Project site has some existing improvements including an existing barn area with associated equipment, dirt and paved roadways, and irrigation ditches. The majority of the Project site is in active agricultural use. The barn structure is located in the central portion of the Project site. Additionally, Woodward Avenue traverses the center of the Project site from east to west, and McKinley Avenue traverses the northern portion of the Project site from north to south.

A Custom Soil Survey was completed for the Project site using the NRCS Web Soil Survey program. The NRCS Soils Map is provided in Figure 3.2-2 in Section 3.2 Agricultural Resources. Table 3.6-1 identifies the type and range of soils found in the Project site.

TABLE 3.6-1: PROJECT SITE SOILS

UNIT SYMBOL	*NAME*	*ACRES IN AOI*	*PERCENT OF AOI*
108	Arents, saline-sodic	81.20	31.4
142	Delhi loamy sand, MLRA 17	17.49	6.8
145	Dello loamy sand, drained	89.91	34.8
166	Grangeville fine sandy loam, partially drained	0.07	0.0
255	Tinnin loamy coarse sand	69.62	27.0

SOURCE: NRCS CUSTOM SOIL SURVEY 2016.

Arents, saline-sodic. The arents, saline-sodic soil is part of the Entisol soils series. Arents do not have diagnostic horizons because they have been deeply mixed by plowing, spading, or other methods of moving by humans.[1] Arents, saline-sodic, consists of deep, somewhat poorly drained soils. They formed in alluvial fans from mixed rock sources. Arents soils are on footslopes. Slopes are 0 to 2 percent. Arents, saline-sodic, have slow runoff. Arents are used mostly as cropland, urban land, or pasture. Some are used as wildlife habitat.

Delhi loamy sand. This series consists of very deep, somewhat excessively drained soils. They formed in wind modified material weathered from granitic rock sources. Delhi soils are on floodplains, alluvial fans and terraces. Slopes are 0 to 15 percent. They have negligible to slow runoff and rapid permeability. Common uses for this series include: growing grapes, peaches, truck crops, alfalfa and for home sites. Principal native plants are buckwheat and a few shrubs and trees. Typical vegetation is annual grasses and forbs.

Dello loamy sand. This series consists of very deep, very poorly drained soils. They formed in alluvium from granitic rock sources. Dello soils are in small depressions and have slopes ranging from 0 to 2 percent. They have slow runoff and rapid permeability. Common uses for this series include: irrigated field and row crops, and pasture. Typical vegetation is sedges, tules, saltgrass, and willows.

Grangeville fine sandy loam. This series consists of very deep, somewhat excessively drained soils. They formed in moderate coarse textured alluvium dominantly from granitic rock sources. Grangeville soils are on alluvial fans and floodplains and have slopes ranging from 0 to 2 percent. They have negligible to very low runoff and moderately rapid permeability. Common uses for this series include: growing alfalfa, grapes, cotton, truck crops and irrigated pasture. Typical vegetation

[1] United States Department of Agriculture, Natural Resources Conservation Service (NRCS). 2016. *Entisols Map*. Accessed July 18, 2016. Available at: <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/class/maps/?cid=nrcs142p2_053597>.

is annual grasses and forbs with native alkali-tolerant plants and few scattered oak and cottonwood trees.

Tinnin loamy coarse sand. This series consists of well drained soils on low fan terraces and alluvial fans. These soils are very deep, and form in alluvium derived from granitic rock sources. Slopes range from 0 to 2 percent. This series is characterized as well draining, slow runoff, and rapid permeability. Common uses for this series are irrigated cropland growing primarily almonds, alfalfa, onions, tomatoes, small grains, grapes and pasture. Vegetation consists of red brome, filaree, soft chess, wildoats, ripgut brome and scattered valley oaks.

FAULTS AND SEISMICITY

Faults

A fault is a fracture in the crust of the earth along which rocks on one side have moved relative to those on the other side. A fault trace is the line on the earth's surface defining the fault. Displacement of the earth's crust along faults releases energy in the form of earthquakes and in some cases in fault creep. Most faults are the result of repeated displacements over a long period of time.

Surface rupture occurs when movement on a fault deep within the earth breaks through to the surface. Surface ruptures have been known to extend up to 50 miles with displacements of an inch to 20 feet. Fault rupture almost always follows preexisting faults, which are zones of weakness. Rupture may occur suddenly during an earthquake or slowly in the form of fault creep. Sudden displacements are more damaging to structures because they are accompanied by shaking.

The State of California designates faults as active, potentially active, and inactive depending on how recent the movement that can be substantiated for a fault. Table 3.6-2 presents the California fault activity rating system.

TABLE 3.6-2: FAULT ACTIVITY RATING

FAULT ACTIVITY RATING	*GEOLOGIC PERIOD OF LAST RUPTURE*	*TIME INTERVAL (YEARS)*
Active (A)	Holocene	Within last 11,000 years
Potentially Active (PA)	Quaternary	11,000-1.6 Million Years
Inactive (I)	Pre-Quaternary	Greater than 1.6 Million

SOURCE: CALIFORNIA GEOLOGICAL SURVEY.

The U.S. Geological Survey identifies potential seismic sources within 39 kilometers (24 miles) of the Project site. Two of the closest known faults classified as active by the California Geological Survey are the Midway fault, located approximately 16 miles to the west, and the San Joaquin fault, located approximately 13 miles to the southwest. The Greenville fault zone is located approximately 24 miles to the west. Other faults that could potentially affect the proposed Project include the Foothills fault system, Corral Hollow-Carnegie fault zone, Los Positas fault, and Antioch fault. Figure 3.6-1 provides a map of known area faults.

Seismicity

The amount of energy available to a fault is determined by considering the slip-rate of the fault, its area (fault length multiplied by down-dip width), maximum magnitude, and the rigidity of the displaced rocks. These factors are combined to calculate the moment (energy) release on a fault. The total seismic energy release for a fault source is sometimes partitioned between two different recurrence models, the characteristic and truncated Gutenberg-Richter (G-R) magnitude-frequency distributions. These models incorporate our knowledge of the range of magnitudes and relative frequency of different magnitudes for a particular fault. The partition of moment and the weights for multiple models are given in the following summary.

Earthquakes are generally expressed in terms of intensity and magnitude. Intensity is based on the observed effects of ground shaking on people, buildings, and natural features. By comparison, magnitude is based on the amplitude of the earthquake waves recorded on instruments, which have a common calibration. The Richter scale, a logarithmic scale ranging from 0.1 to 9.0, with 9.0 being the strongest, measures the magnitude of an earthquake relative to ground shaking. Table 3.6-3 provides a description and a comparison of intensity and magnitude.

TABLE 3.6-3: MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES

RICHTER MAGNITUDE	*MODIFIED MERCALLI SCALE*	*EFFECTS OF INTENSITY*
0.1 – 0.9	I	Earthquake shaking not felt
1.0 – 2.9	II	Shaking felt by those at rest.
3.0 – 3.9	III	Felt by most people indoors, some can estimate duration of shaking.
4.0 – 4.5	IV	Felt by most people indoors. Hanging objects rattle, wooden walls and frames creak.
4.6 – 4.9	V	Felt by everyone indoors, many can estimate duration of shaking. Standing autos rock. Crockery clashes, dishes rattle and glasses clink. Doors open, close and swing.
5.0 – 5.5	VI	Felt by all who estimate duration of shaking. Sleepers awaken, liquids spill, objects are displaced, and weak materials crack.
5.6 – 6.4	VII	People frightened and walls unsteady. Pictures and books thrown, dishes and glass are broken. Weak chimneys break. Plaster, loose bricks and parapets fall.
6.5 – 6.9	VIII	Difficult to stand. Waves on ponds, cohesionless soils slump. Stucco and masonry walls fall. Chimneys, stacks, towers, and elevated tanks twist and fall.
7.0 – 7.4	IX	General fright as people are thrown down, hard to drive. Trees broken, damage to foundations and frames. Reservoirs damaged, underground pipes broken.
7.5 – 7.9	X	General panic. Ground cracks, masonry and frame buildings destroyed. Bridges destroyed, railroads bent slightly. Dams, dikes and embankments damaged.
8.0 – 8.4	XI	Large landslides, water thrown, general destruction of buildings. Pipelines destroyed, railroads bent.
8.5 +	XII	Total nearby damage, rock masses displaced. Lines of sight/level distorted. Objects thrown into air.

SOURCE: CALIFORNIA GEOLOGICAL SURVEY.

According to the California Geological Survey's Probabilistic Seismic Hazard Assessment Program, San Joaquin County is considered to be within an area that is predicted to have a 10 percent probability that a seismic event would produce horizontal ground shaking of 10 to 20 percent within a 50-year period. This level of ground shaking correlates to a Modified Mercalli intensity of V to VII, light to strong. As a result of these factors the California Geological Survey has defined the entire county as a seismic hazard zone. The Uniform Building Code places all of California in the zone of greatest earthquake severity because recent studies indicate high potential for severe ground shaking.

Alquist-Priolo Special Study Zone

The California legislature passed the Alquist-Priolo Special Studies Zone Act in 1972 to address seismic hazards associated with faults and to establish criteria for developments for areas with identified seismic hazard zones. The California Geologic Survey (CGS) evaluates faults with available geologic and seismologic data and determines if a fault should be zoned as active, potentially active, or inactive. If CGS determines a fault to be active, then it is typically incorporated into a Special Studies Zone in accordance with the Alquist-Priolo Earthquake Hazard Act. Alquist-Priolo Special Study Zones are usually one-quarter mile or less in width and require site-specific evaluation of fault location and require a structure setback if the fault is found traversing a project site. The Project site is not within an Alquist-Priolo Special Study Zone.

SEISMIC HAZARDS

Seismic Ground Shaking

The potential for seismic ground shaking in California is expected. As a result of the foreseeable seismicity in California, the State requires special design considerations for all structural improvements in accordance with the seismic design provisions in the California Building Code. These seismic design provisions require enhanced structural integrity based on several risk parameters. Seismic ground shaking in the Project site is expected during the life of the proposed Project. All structures will be built in accordance with the California Building Code's seismic design standards.

Fault Rupture

A fault rupture occurs when the surface of the earth breaks as a result of an earthquake, although this does not happen with all earthquakes. These ruptures generally occur in a weak area of an existing fault. Ruptures can be sudden (i.e. earthquake) or slow (i.e. fault creep). The Alquist-Priolo Fault Zoning Act requires active earthquake fault zones to be mapped and it provides special development considerations within these zones. The Project site does not have surface expression of active faults and fault rupture is not anticipated.

Liquefaction

Liquefaction typically requires a significant sudden decrease of shearing resistance in cohesionless soils and a sudden increase in water pressure, which is typically associated with an earthquake of

high magnitude. The potential for liquefaction is highest when groundwater levels are high, and loose, fine, sandy soils occur at depths of less than 50 feet. Soil data from the NRCS Web Soil Survey (NRCS 2015) suggests that the potential for liquefaction is moderate given that the soils are high in sand and the water table is moderately high.

The City of Manteca General Plan Draft EIR has indicated that "Given that there is a relatively high water table, liquefaction could be a significant impact within the Study Area." The General Plan Draft EIR indicates that with the implementation of goals, policies, and implementation measures from the 2023 General Plan Safety Element the potentially significant impact would be reduced to a less than significant impact.

Lateral Spreading

Lateral spreading typically results when ground shaking moves soil toward an area where the soil integrity is weak or unsupported, and it typically occurs on the surface of a slope, although it does not occur strictly on steep slopes. Oftentimes, lateral spreading is directly associated with areas of liquefaction. Since the potential for liquefaction is moderate to high, the potential for lateral spreading is present. The General Plan Draft EIR indicates that with the implementation of goals, policies, and implementation measures from the 2023 General Plan Safety Element the potentially significant impact would be reduced to a less than significant impact.

Landslides

Landslides include rockfalls, deep slope failure, and shallow slope failure. Factors such as the geological conditions, drainage, slope, vegetation, and others directly affect the potential for landslides. One of the most common causes of landslides is construction activity that is associated with road building (i.e. cut and fill). The Project site is essentially flat; therefore, the potential for a landslide in the Project site is non-existent.

NON-SEISMIC HAZARDS

Expansive Soils

Expansive soils can undergo significant volume change with changes in moisture content. They shrink and harden when dried and expand and soften when wet. If structures are underlain by expansive soils, it is important that foundation systems be capable of tolerating or resisting any potentially damaging soil movements. In addition, it is important to limit moisture changes in the surficial soils by using positive drainage away from buildings as well as limiting landscaping watering.

According to the NRCS Web Soil Survey, the soils in the Project site have a low shrink-swell potential. The NRCS Web Soil Survey indicated that near surface soils within the Project site have low plasticity, and the expansion potential of the soils would respond to fluctuations in moisture content. Figure 3.6-2 provides a map of the shrink-swell potential of the soils at the Project site and in the vicinity.

Erosion

Erosion naturally occurs on the surface of the earth as surface materials (i.e. rock, soil, debris, etc.) is loosened, dissolved, or worn away, and transported from one place to another by gravity. Two common types of soil erosion include wind erosion and water erosion. The steepness of a slope is an important factor that affects soil erosion. Erosion potential in soils is influenced primarily by loose soil texture and steep slopes. Loose soils can be eroded by water or wind forces, whereas soils with high clay content are generally susceptible only to water erosion. The potential for erosion generally increases as a result of human activity, primarily through the development of facilities and impervious surfaces and the removal of vegetative cover.

The *Custom Soils Report* identified the erosion potential for the soils in the Project site. This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. Soil property data for each map unit component includes the hydrologic soil group, erosion factors Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the surface horizon.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. Within the Project site, the erosion factor Kf varies from 0.10 to 0.28, which is considered a low to moderate potential for erosion. Furthermore, because the Project site is essentially flat, the erosion potential is slight.

Collapsible Soils

Collapsible soils undergo a rearrangement of their grains and a loss of cementation, resulting in substantial and rapid settlement under relatively low loads. Collapsible soils occur predominantly at the base of mountain ranges, where Holocene-age alluvial fan and wash sediments have been deposited during rapid run-off events. Soils prone to collapse are commonly associated with manmade fill, wind-laid sands and silts, and alluvial fan and mudflow sediments deposited during flash floods. During an earthquake, even slight settlement of fill materials can lead to a differentially settled structure and significant repair costs. Differential settlement of structures typically occurs when heavily irrigated landscape areas are near a building foundation. Examples of common problems associated with collapsible soils include tilting floors, cracking or separation in structures, sagging floors, and nonfunctional windows and doors. Collapsible soils have not been identified in the Manteca General Plan as an issue in the Manteca area. However, in areas subject to potential liquefaction, the potential for liquefaction induced settlement is present.

Subsidence

Land subsidence is the gradual settling or sinking of an area with little or no horizontal motion due to changes taking place underground. It is a natural process, although it can also occur (and is greatly accelerated) as a result of human activities. Common causes of land subsidence from human activity include: pumping water, oil, and gas from underground reservoirs; dissolution of limestone aquifers (sinkholes); collapse of underground mines; drainage of organic soils; and initial

wetting of dry soils. Subsidence has not been identified in the Manteca General Plan as an issue in the Manteca area.

MINERAL RESOURCES

The primary mineral resources in San Joaquin County are sand, gravel, and natural gas, with limited mining of peat, gold, and silver. In 2012, the California Geological Survey assessed the Stockton-Lodi Production-Consumption (P-C) Region mineral resources, with a focus on aggregate resources. Mineral resources in the region are classified based on whether the aggregate meets the specifications for use in portland cement concrete-grade (PCC). This aggregate is termed "PCC-grade aggregate." The material quality specifications for PCC-grade aggregate are more restrictive than the specifications for aggregate for other applications. As a result of the strict specifications, PCC-grade aggregate deposits are more scarce and valuable than other aggregate resources.

Known Mineral Resources

The California Geological Survey issued Special Report 199 designating areas within the Stockton-Lodi P-C Region based on the significance of mineral resources. The Stockton-Lodi P-C Region contains about 969 million tons PCC-grade aggregate resources and 67 million tons PCC-grade sand resources. These resources are classified into different mineral resource zone designations, as described below.

To be considered significant for the purpose of mineral land classification, a mineral deposit or group of deposits, must meet criteria adopted by the State Mining and Geology Board. These criteria include marketability and threshold values. The threshold value is approximately $17.375 million for a construction aggregate deposit. PCC-grade aggregate sells for about $13 per ton in the Stockton-Lodi P-C Region; therefore, $17,375,000 equates to about 1.3 million tons of PCC-grade aggregate material.

The following Mineral Resource Zone (MRZ) descriptions are for PCC-grade aggregate.

> *MRZ-1:* Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.
>
> *MRZ-2:* Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists.
>
> *MRZ-3:* Areas containing mineral deposits, the significance of which cannot be evaluated from available data.
>
> *MRZ-4:* Areas where available information is inadequate for assignment to any other MRZ zone.

Mineral Extraction Activities

Approximately 232 million tons of PCC-grade aggregate reserves are permitted for production in the County (CGS, 2012). There are 34 active and inactive aggregate mines within San Joaquin County (San Joaquin County, 2009). Three mines are located in the vicinity of the Project site:

Mine ID# 91-39-0001 – Oakwood Lake. Mine is closed and was operated by Beck Properties.

Mine ID# 91-39-0012 – Mossdale Road. Mine is closed and was operated by FTG Construction Materials.

Mine ID# 91-39-0022 – Mossdale-Brown Sand. Mine is active and is operated by Brown Sand, Inc.

Project Site

The Project site is located within MRZ-1. The MRZ-1 designation applies to areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood for their presence exists. No known natural gas fields were identified in the vicinity of the Project site (San Joaquin County, 1992).

3.6.2 REGULATORY SETTING

FEDERAL

Uniform Building Code (UBC)

The purpose of the Uniform Building Code (UBC) is to provide minimum standards to preserve the public peace, health, and safety by regulating the design, construction, quality of materials, certain equipment, location, grading, use, occupancy, and maintenance of all buildings and structures. UBC standards address foundation design, shear wall strength, and other structurally related conditions.

Hazardous Materials Transportation Act

The Hazardous Materials Transportation Act, as amended, is the basic statute regulating hazardous materials transportation in the United States. The purpose of the law is to provide adequate protection against the risks to life and property inherent in transporting hazardous materials in interstate commerce. This law gives the U.S. Department of Transportation (USDOT) and other agencies the authority to issue and enforce rules and regulations governing the safe transportation of hazardous materials (DOE 2002).

STATE

California Building Standards Code

Title 24 of the California Code of Regulations, known as the California Building Standards Code (CBSC) or just "Title 24," contains the regulations that govern the construction of buildings in California. The CBSC includes 12 parts including: California Building Standards Administrative Code, California Building Code, California Residential Building Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Historical Building Code, California Fire Code, California Existing Building Code, California Green Building Standards Code (CALGreen Code), California Reference Standards Code. Through the CBSC, the state provides a minimum standard for building design and construction. The CBSC contains specific requirements

for seismic safety, excavation, foundations, retaining walls and site demolition. It also regulates grading activities, including drainage and erosion control.

California Building Code

The California Building Code, Title 24, Part 2, Chapter 16 addresses structural design, Chapter 17 addresses structural tests and special inspections, and Chapter 18 addresses soils and foundations. Section 1610 provides structural design standards for foundation walls and retaining walls to ensure resistance to lateral soil loads. Section 1613 provides structural design standards for earthquake loads. Section 1704.7 requires special inspections for existing site soil conditions, fill placement and load-bearing requirements during the construction as specified in Table 1704.7 of this section. Sections 1704.8 through 1704.16 provide inspection and testing requirements for various foundation types, and construction material types. Section 1803.1.1.1 requires each city and county enact an ordinance which requires a preliminary soil report and that the report be based upon adequate test borings or excavations, of every subdivision, where a tentative and final map is required pursuant to Section 66426 of the Government Code. Section 1803.5.3 defines expansive soils and specifies that in areas likely to have expansive soil, the building official shall require soil tests to determine where such soils do exist. Section 1803.5.4 specifies that a subsurface soil investigation must be performed to determine whether the existing ground-water table is above or within 5 feet (1524 mm) below the elevation of the lowest floor level where such floor is located below the finished ground level adjacent to the foundation. Section 1803.5.8 provides specific standards where shallow foundations will bear on compacted fill material more than 12 inches (305 mm) in depth. Section 1803.5.11 and 1803.5.12 provide requirements for geotechnical investigations for structures assigned varying Seismic Design Categories in accordance with Section 1613. Section 1804 provides standards and requirements for excavation, grading, and fill. Section 1808, 1809, and 1810 provides standards and requirements for the construction of varying foundations.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 sets forth the policies and Criteria of the State Mining and Geology Board, which governs the exercise of governments' responsibilities to prohibit the location of developments and structures for human occupancy across the trace of active faults. The policies and criteria are limited to potential hazards resulting from surface faulting or fault creep within Earthquake Fault Zones, as delineated on maps officially issued by the State Geologist. Working definitions include:

- Fault – a fracture or zone of closely associated fractures along which rocks on one side have been displaced with respect to those on the other side;

- Fault Zone – a zone of related faults, which commonly are braided and sub parallel, but may be branching and divergent. A fault zone has a significant width (with respect to the scale at which the fault is being considered, portrayed, or investigated), ranging from a few feet to several miles;

- Sufficiently Active Fault – a fault that has evidence of Holocene surface displacement along one or more of its segments or branches (last 11,000 years); and

- Well-Defined Fault – a fault whose trace is clearly detectable by a trained geologist as a physical feature at or just below the ground surface. The geologist should be able to locate the fault in the field with sufficient precision and confidence to indicate that the required site-specific investigations would meet with some success.

"Sufficiently Active" and "Well Defined" are the two criteria used by the State to determine if a fault should be zoned under the Alquist-Priolo Act.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act, passed in 1990, addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically-induced landslides. Under the Act, seismic hazard zones are to be mapped by the State Geologist to assist local governments in land use planning. The program and actions mandated by the Seismic Hazards Mapping Act closely resemble those of the Alquist-Priolo Earthquake Fault Zoning Act (which addresses only surface fault-rupture hazards) and are outlined below:

The State Geologist is required to delineate the various "seismic hazard zones."

- Cities and Counties, or other local permitting authority, must regulate certain development "projects" within the zones. They must withhold the development permits for a site within a zone until the geologic and soil conditions of the site are investigated and appropriate mitigation measures, if any, are incorporated into development plans.

- The State Mining and Geology Board provides additional regulations, policies, and criteria, to guide cities and counties in their implementation of the law. The Board also provides guidelines for preparation of the Seismic Hazard Zone Maps and for evaluating and mitigating seismic hazards.

- Sellers (and their agents) of real property within a mapped hazard zone must disclose that the property lies within such a zone at the time of sale.

Caltrans Seismic Design Criteria

The California Department of Transportation (Caltrans) has Seismic Design Criteria (SDC), which is an encyclopedia of new and currently practiced seismic design and analysis methodologies for the design of new bridges in California. The SDC adopts a performance-based approach specifying minimum levels of structural system performance, component performance, analysis, and design practices for ordinary standard bridges. The SDC has been developed with input from the Caltrans Offices of Structure Design, Earthquake Engineering and Design Support, and Materials and Foundations. Memo 20-1 outlines the bridge category and classification, seismic performance criteria, seismic design philosophy and approach, seismic demands and capacities on structural components and seismic design practices that collectively make up Caltrans' seismic design methodology.

Surface Mining and Reclamation Act of 1975

The State Mining and Reclamation Act of 1975 (California Public Resources Code [PRC] Section 2710 et seq.) (SMARA) required that the California State Geologist implement a mineral land classification system to identify and protect mineral resources of regional or statewide significance in areas where urban expansion or other irreversible land uses may occur. This information is intended to be considered in local land use planning activities through the adoption of general plan mineral resource management policies (California Public Resources Code Section 2762). The California State Mining and Geology Board (SMGB) classifies such urban and non-urban lands according to a priority list, or when the Board is otherwise petitioned to classify a particular land area.

As mandated by SMARA, aggregate mineral resources within the State are classified by the SMGB through application of the MRZ System. The MRZ is used to map all mineral commodities within identified jurisdictional boundaries, with priority given to areas where future mineral resource extraction may be prevented or restricted by land use compatibility issues, or where mineral resources may be mined during the 50-year period following their classification. The MRZ classifies lands that contain mineral deposits and identifies the presence or absence of substantial sand and gravel deposits and crushed rock source areas (i.e., commodities used as, or in the production of, construction materials).

PRC Section 2762(d) and 2763 requires a lead agency to prepare a statement specifying its reasons for permitting a use that would threaten the potential to extract mineral resources either 1) in an area that has been designated in its general plan as having important minerals to be protected, or 2) f the use is proposed in an area with significant resources pursuant to Section 2761(b)(2) and the lead agency has not yet acted on State's designation. PRC Section 2763 requires that lead agency land use decisions involving areas designated as being of regional significance shall be in accordance with the lead agency's mineral resource management policies and shall also, in balancing mineral values against alternative land uses, consider the importance of these minerals to their market region as a whole and not just their importance to the lead agency's area of jurisdiction.

Division of Mines and Geology

The California Division of Mines and Geology (DMG) operates within the Department of Conservation. The DMG is responsible for assisting in the utilization of mineral deposits and the identification of geological hazards.

State Geological Survey

Similar to the DMG, the California Geological Survey is responsible for assisting in the identification and proper utilization of mineral deposits, as well as the identification of fault locations and other geological hazards.

Public Resources Code

PRC Section 2762(d) and 2763 requires a lead agency to prepare a statement specifying its reasons for permitting a use that would threaten the potential to extract mineral resources either 1) in an area that has been designated in its general plan as having important minerals to be protected, or 2) if the use is proposed in an area with significant resources pursuant to Section 2761(b)(2) and the lead agency has not yet acted on the State's designation. PRC Section 2763 requires that lead agency land use decisions involving areas designated as being of regional significance shall be in accordance with the lead agency's mineral resource management policies and shall also, in balancing mineral values against alternative land uses, consider the importance of these minerals to their market region as a whole and not just their importance to the lead agency's area of jurisdiction.

LOCAL

City of Manteca General Plan

POLICIES: GEOLOGIC AND SEISMIC SAFETY

- S-P-1. The City shall require preparation of geological reports and/or geological engineering reports for proposed new development located in areas of potentially significant geological hazards, including potential subsidence (collapsible surface soils) due to groundwater extraction.
- S-P-2. The City shall require new development to mitigate the potential impacts of geologic hazards through Building Plan review.
- S-P-3. The City shall require new development to mitigate the potential impacts of seismic induced settlement of uncompacted fill and liquefaction (water-saturated soil) due to the presence of a high water table.
- S-P-4. The City shall maintain an inventory of pre-1940 unreinforced masonry buildings within the city. No change in use to a higher occupancy or more intensive use shall be approved in such structures until an engineering evaluation of the structure has been conducted and any structural deficiencies corrected. The Redevelopment Agency shall be encouraged to assist property owners in reinforcing buildings.
- S-P-5. The City shall ensure that all public facilities, such as buildings, water tanks, and reservoirs, are structurally sound and able to withstand seismic shaking and the effects of seismically induced ground failure.
- S-P-6. The City shall comply with the California State seismic and building standards in the design and siting of critical facilities, including police and fire stations, school facilities, hospitals, hazardous materials manufacturing and storage facilities, and large public assembly halls.

IMPLEMENTATION: GEOLOGIC AND SEISMIC SAFETY

- S-I-1. All new development shall comply with the current Uniform Building Code (UBC) requirements that stipulate building structural material and reinforcement.

- S-I-2. All new development shall comply with California Health and Safety Code Section 19100 et seq. (Earthquake Protection Law), which requires that buildings be designed to resist stresses produced by natural forces such as earthquakes and wind.
- S-I-3. The City shall inventory potentially hazardous buildings within the city and adopt a mitigation program, including requirements for strengthening buildings, changing the use of the buildings to an acceptable occupancy level, or demolishing the buildings.

3.6.3 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the proposed Project will have a significant impact on geology and soils if it will:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
    - Strong seismic ground shaking; or
    - Seismic-related ground failure, including liquefaction;
- Result in substantial soil erosion or the loss of topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse;
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property;
- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater;
- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; and/or
- Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

IMPACTS AND MITIGATION MEASURES

Impact 3.6-1: The proposed Project may expose people or structures to potential substantial adverse effects involving strong seismic ground shaking or seismic related ground failure. (Less than Significant)

The California Geologic Survey (CGS) evaluates faults and determines if a fault should be zoned as active, potentially active, or inactive. All active faults are incorporated into a Special Studies Zone, also referred to as an Alquist-Priolo Special Study Zone. The Project site is not within an Alquist-Priolo Special Study Zone.

The U.S. Geological Survey identifies potential seismic sources within 39 kilometers (24 miles) of the Project site. Two of the closest known faults classified as active by the California Geological Survey are the Midway fault, located approximately 16 miles to the west, and the San Joaquin

fault, located approximately 13 miles to the southwest. The Greenville fault zone is located approximately 24 miles to the west. Other faults that could potentially affect the proposed Project include the Foothills fault system, Corral Hollow-Carnegie fault zone, Los Positas fault, and Antioch fault.

According to the California Geological Survey's Probabilistic Seismic Hazard Assessment Program, Manteca is considered to be within an area that is predicted to have a 10 percent probability that a seismic event would produce horizontal ground shaking of 10 to 20 percent within a 50-year period. This level of ground shaking correlates to a Modified Mercalli intensity of V to VII, light to strong. As a result of these factors the California Geological Survey has defined the entire county as a seismic hazard zone. The Uniform Building Code places all of California in the zone of greatest earthquake severity because recent studies indicate high potential for severe ground shaking.

There will always be a potential for groundshaking caused by seismic activity anywhere in California, including the Project site. Seismic activity could come from a known active fault such as the Greenville fault, or any number of other faults in the region. In order to minimize potential damage to the buildings and site improvements, all construction in California is required to be designed in accordance with the latest seismic design standards of the California Building Code. As discussed under Section 3.6.2 Regulatory Setting, the California Building Code, Title 24, Part 2, Chapter 16 addresses structural design and Chapter 18 addresses soils and foundations. Collectively, these state requirements, which have been adopted by the City of Manteca, include design standards and requirements that are intended to minimize impacts to structures in seismically active areas of California. Section 1613 specifically provides structural design standards for earthquake loads. Section 1803.5.11 and 1803.5.12 provide requirements for geotechnical investigations for structures assigned varying Seismic Design Categories in accordance with Section 1613. Additionally, the City of Manteca has adopted Design and Construction Standards and incorporated numerous policies relative to seismicity to ensure the health and safety of all people. Design in accordance with these standards and policies would reduce any potential impact to a less than significant level.

Impact 3.6-2: Implementation and construction of the proposed Project may result in substantial soil erosion or the loss of topsoil. (Less than Significant)

According to the United States Environmental Protection Agency, polluted stormwater runoff is a leading cause of impairment to the nearly 40 percent of surveyed U.S. water bodies which do not meet water quality standards. Over land or via storm sewer systems, polluted runoff is discharged, often untreated, directly into local water bodies. Soil erosion and the loss of topsoil is one of the most common sources of polluted stormwater runoff during construction activities. When left uncontrolled, storm water runoff can erode soil and cause sedimentation in waterways, which collectively result in the destruction of fish, wildlife, and aquatic life habitats; a loss in aesthetic value; and threats to public health due to contaminated food, drinking water supplies, and recreational waterways.

Mandated by Congress under the Clean Water Act, the NPDES Stormwater Program is a comprehensive two-phased national program for addressing the non-agricultural sources of stormwater discharges which adversely affect the quality of our nation's waters. The program uses the National Pollutant Discharge Elimination System (NPDES) permitting mechanism to require the implementation of controls designed to prevent harmful pollutants, including soil erosion, from being washed by stormwater runoff into local water bodies. The construction activities for the proposed Project would be governed by the General Permit 2009-0009-DWQ (amended by 2010-0014-DWQ & 2012-0006-DWQ), which states:

> *"…Particular attention must be paid to large, mass graded sites where the potential for soil exposure to the erosive effects of rainfall and wind is great and where there is potential for significant sediment discharge from the site to surface waters. Until permanent vegetation is established, soil cover is the most cost-effective and expeditious method to protect soil particles from detachment and transport by rainfall. Temporary soil stabilization can be the single most important factor in reducing erosion at construction sites. The discharger is required to consider measures such as: covering disturbed areas with mulch, temporary seeding, soil stabilizers, binders, fiber rolls or blankets, temporary vegetation, and permanent seeding. These erosion control measures are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed. Erosion control BMPs should be the primary means of preventing storm water contamination, and sediment control techniques should be used to capture any soil that becomes eroded…"*

General Permit 2009-0009-DWQ (amended by 2010-0014-DWQ & 2012-0006-DWQ) further states that:

> *"Sediment control BMPs should be the secondary means of preventing storm water contamination. When erosion control techniques are ineffective, sediment control techniques should be used to capture any soil that becomes eroded. The discharger is required to consider perimeter control measures such as: installing silt fences or placing straw wattles below slopes. These sediment control measures are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed…Inappropriate management of run-on and runoff can result in excessive physical impacts to receiving waters from sediment and increased flows. The discharger is required to manage all run-on and runoff from a project site. Examples include: installing berms and other temporary run-on and runoff diversions…All measures must be periodically inspected, maintained and repaired to ensure that receiving water quality is protected. Frequent inspections coupled with thorough documentation and timely repair is necessary to ensure that all measures are functioning as intended…"*

To ensure that construction activities are covered under General Permit 2009-0009-DWQ (amended by 2010-0014-DWQ & 2012-0006-DWQ), projects in California must prepare a Stormwater Pollution Prevention Plan (SWPPP) containing Best Management Practices (BMPs) to reduce erosion and sediments to meet water quality standards. Such BMPs may include:

temporary erosion control measures such as silt fences, staked straw bales/wattles, silt/sediment basins and traps, check dams, geofabric, sandbag dikes, and temporary revegetation or other ground cover. The BMPs and overall SWPPP is reviewed by the Regional Water Quality Control Board as part of the permitting process. The SWPPP, once approved, is kept on site and implemented during construction activities and must be made available upon request to representatives of the RWQCB and/or the lead agency.

The Custom Soils Report identified the erosion potential for the soils in the Project site. This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. Soil property data for each map unit component includes the hydrologic soil group, erosion factors Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the surface horizon.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. Within the Project site, the erosion factor Kf varies from 0.10 to 0.28, which is considered a low to moderate potential for erosion. Furthermore, because the Project site is essentially flat, the erosion potential is considered slight. Regardless of the potential for erosion, there is always the potential for human caused erosion associated with construction activities or through the operational phase of a project. Grading, excavation, removal of vegetation cover, and loading activities associated with construction activities temporarily expose soils and increase the potential for soil erosion and sedimentation during rail events. Construction activities can also result in soil compaction and wind erosion effects that can adversely affect soils and reduce the revegetation potential at construction sites and staging areas.

In accordance with the NPDES Stormwater Program, Mitigation Measure 3.6-1 requires an approved SWPPP designed to control erosion and the loss of topsoil to the extent practicable using BMPs that the RWQCB has deemed effective in controlling erosion, sedimentation, runoff during construction activities. The RWQCB has stated that these erosion control measures are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed. The specific controls are subject to the review and approval by the RWQCB and are existing regulatory requirements. Implementation of the proposed Project would have a **less than significant** impact relative to this topic.

MITIGATION MEASURE(S)

Mitigation Measure 3.6-1: *Prior to clearing, grading, and disturbances to the ground such as stockpiling, or excavation, the Project proponent shall submit a Notice of Intent (NOI) and Storm Water Pollution Prevention Plan (SWPPP) to the RWQCB to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit Order 2009-0009-DWQ amended by 2010-0014-DWQ & 2012-0006-DWQ). The SWPPP shall be designed with Best Management Practices (BMPs) that the RWQCB has deemed as effective at reducing erosion, controlling sediment, and managing runoff. These include: covering disturbed areas with mulch, temporary seeding, soil stabilizers, binders, fiber rolls or blankets, temporary vegetation, and permanent seeding. Sediment control BMPs, installing silt fences or placing straw*

wattles below slopes, installing berms and other temporary run-on and runoff diversions. These BMPs are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed. Final selection of BMPs will be subject to approval by City of Manteca and the RWQCB. The SWPPP will be kept on site during construction activity and will be made available upon request to representatives of the RWQCB.

Impact 3.6-3: The proposed Project has the potential to be located on a geologic unit or soil that is unstable, or that would become unstable as a result of Project implementation, and potentially result in landslide, lateral spreading, subsidence, liquefaction or collapse. (Less than Significant with Mitigation)

LIQUEFACTION

Soil liquefaction results from loss of strength during cyclic loading, such as imposed by earthquakes. Soils most susceptible to liquefaction are clean, loose, saturated, and uniformly graded, fine-grained sands. Soil data from the NRCS Web Soil Survey (NRCS 2015) suggests that the potential for liquefaction is moderate given that the soils are high in sand and the water table is moderately high.

The City of Manteca General Plan Draft EIR has indicated that "Given that there is a relatively high water table, liquefaction could be a significant impact within the Study Area." The General Plan Draft EIR indicates that with the implementation of goals, policies, and implementation measures from the 2023 General Plan Safety Element the potentially significant impact would be reduced to a less than significant impact.

LATERAL SPREADING

Lateral spreading typically results when ground shaking moves soil toward an area where the soil integrity is weak or unsupported, and it typically occurs on the surface of a slope, although it does not occur strictly on steep slopes. Oftentimes, lateral spreading is also directly associated with areas of liquefaction. Since the potential for liquefaction is moderate to high, the potential for lateral spreading is present. The General Plan Draft EIR indicates that with the implementation of goals, policies, and implementation measures from the 2023 General Plan Safety Element the potentially significant impact would be reduced to a less than significant impact.

LANDSLIDES

Landslides include rockfalls, deep slope failure, and shallow slope failure. Factors such as the geological conditions, drainage, slope, vegetation, and others directly affect the potential for landslides. One of the most common causes of landslides is construction activity that is associated with road building (i.e. cut and fill). The Project site is essentially flat; therefore, the potential for a landslide in the Project site is non-existent.

COLLAPSIBLE SOILS

Collapsible soils undergo a rearrangement of their grains and a loss of cementation, resulting in substantial and rapid settlement under relatively low loads. Collapsible soils occur predominantly at the base of mountain ranges, where Holocene-age alluvial fan and wash sediments have been deposited during rapid run-off events. Differential settlement of structures typically occurs when heavily irrigated landscape areas are near a building foundation. Examples of common problems associated with collapsible soils include tilting floors, cracking or separation in structures, sagging floors, and nonfunctional windows and doors. Collapsible soils have not been identified in the Manteca General Plan as an issue in the Manteca area. However, in areas subject to potential liquefaction, the potential for liquefaction induced settlement is present. The General Plan Draft EIR indicates that with the implementation of goals, policies, and implementation measures from the 2023 General Plan Safety Element the potentially significant impacts relating to liquefaction would be reduced to a less than significant impact.

SUBSIDENCE

Land subsidence is the gradual settling or sinking of an area with little or no horizontal motion due to changes taking place underground. It is a natural process, although it can also occur (and is greatly accelerated) as a result of human activities. Common causes of land subsidence from human activity include: pumping water, oil, and gas from underground reservoirs; dissolution of limestone aquifers (sinkholes); collapse of underground mines; drainage of organic soils; and initial wetting of dry soils. Subsidence has not been identified in the Manteca General Plan.

CONCLUSION

The Project site does not have a significant risk of becoming unstable as a result landslide, subsidence, or soil collapse. There is a potential for liquefaction, liquefaction induced settlement, and lateral spreading. However, through the implementation of Mitigation Measure 3.6-2, the proposed Project would have a **less than significant** impact relative to this topic.

MITIGATION MEASURE(S)

Mitigation Measure 3.6-2*: Prior to earthmoving activities, a certified geotechnical engineer, or equivalent, shall be retained to perform a final geotechnical evaluation of the soils at a design-level as required by the requirements of the California Building Code Title 24, Part 2, Chapter 18, Section 1803.1.1.2 related to expansive soils and other soil conditions. The evaluation shall be prepared in accordance with the standards and requirements outlined in California Building Code, Title 24, Part 2, Chapter 16, Chapter 17, and Chapter 18, which addresses structural design, tests and inspections, and soils and foundation standards. The final geotechnical evaluation shall include design recommendations to ensure that soil conditions do not pose a threat to the health and safety of people or structures, including threats from liquefaction or lateral spreading. The grading and improvement plans, as well as the storm drainage and building plans shall be designed in accordance with the recommendations provided in the final geotechnical evaluation.*

Impact 3.6-4: Potential for expansive soils to create substantial risks to life or property. (Less than Significant with Mitigation)

Expansive soils are those that undergo volume changes as moisture content fluctuates; swelling substantially when wet or shrinking when dry. Soil expansion can damage structures by cracking foundations, causing settlement and distorting structural elements. Expansion is a typical characteristic of certain varieties of clay-type soils. Expansive soils shrink and swell in volume during changes in moisture content, such as a result of seasonal rain events, and can cause damage to foundations, concrete slabs, roadway improvements, and pavement sections.

According to the NRCS Web Soil Survey, the soils in the Project site have a low shrink-swell potential. The NRCS Web Soil Survey indicated that near surface soils within the Project site have low plasticity, and the expansion potential of the soils would respond to fluctuations in moisture content. Figure 3.6-2 provides a map of the shrink-swell potential of the soils at the Project site and in the vicinity.

The California Building Code Title 24, Part 2, Chapter 18, Section 1803.1.1.2 requires specific geotechnical evaluation when a preliminary geotechnical evaluation determines that expansive or other special soil conditions are present, which, if not corrected, would lead to structural defects. The City of Manteca also requires a final geotechnical evaluation to be performed at a design-level to ensure that the foundations, structures, roadway sections, sidewalks, and other improvements can accommodate the specific soils, including expansive soils, at those locations. Mitigation Measure 3.6-2, presented above, provides the requirement for a final geotechnical evaluation in accordance with the standards and requirements outlined in the California Building Code, Title 24, Part 2, Chapter 16, Chapter 17, and Chapter 18, which addresses structural design, tests and inspections, and soils and foundation standards. The final geotechnical evaluation would include design recommendations to ensure that soil conditions do not pose a threat to the health and safety of people or structures. The grading and improvement plans, as well as the storm drainage and building plans, are required to be designed in accordance with the recommendations provided in the final geotechnical evaluation. With the implementation of Mitigation Measure 3.6-2 (requiring a final Geotechnical Evaluation, and site recommendations) the proposed Project would have a **less than significant** impact relative to this topic.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.6-2**.*

Impact 3.6-5: Potential for existing soils to be incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater. (No Impact)

The proposed Project would connect to the municipal sewer system for wastewater disposal. Septic tanks or septic systems are not proposed as part of the Project. As such, **no impact** would occur.

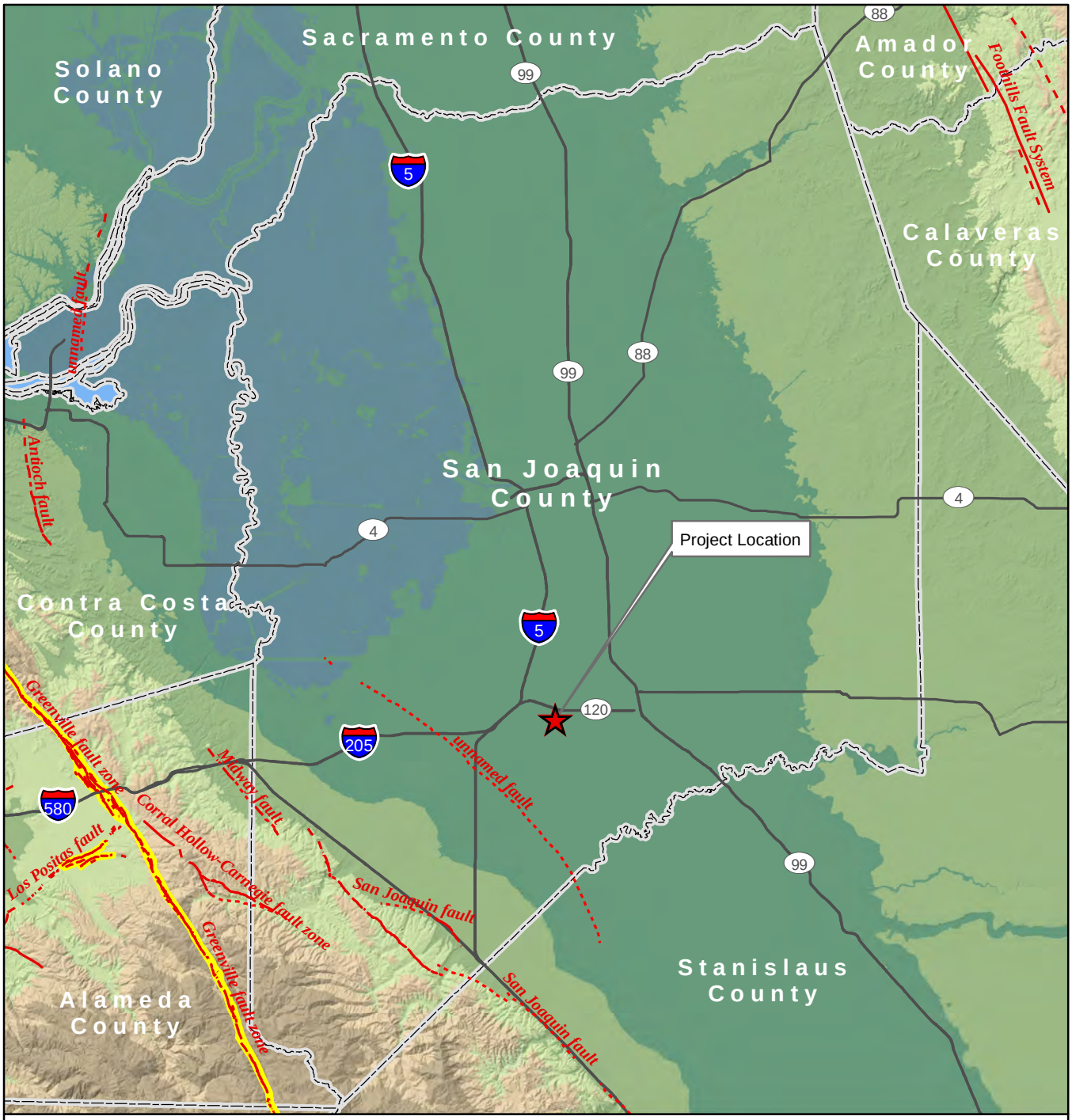
Impact 3.6-6: Potential to result in the loss of a known mineral resource that would be of value to the region. (Less than Significant)

The Project site is located within MRZ-1, which designates areas that do not have significant mineral deposits present. No known natural gas fields were identified in the vicinity of the Project site (San Joaquin County, 1992). Therefore, this impact is considered **less than significant**.

Impact 3.6-7: Potential to result in the loss of a locally important mineral resource recovery site delineated on a local general plan. (Less than Significant)

The City's General Plan and General Plan EIR indicate that the California Division of Mines and Geology has identified one location within the General Plan Study Area (near the San Joaquin River) as a Zone MRZ-2, Significant Mineral Resource Zone. The General Plan EIR indicates that Brown Sand and Gravel, Incorporated, has produced processed sand at the Oakwood Lake Pit, located immediately west of the Project site and within the MRZ-2 zone. These mining operations have ceased and a residential development and lake have been developed on the previously operating mine, which is outside the city limits. The Project site is not located within a Mineral Resource Zone and, as such, would not result in the loss of a locally important mineral resources recovery site. Therefore, this impact would be **less than significant**.

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Quaternary Faults

- Well-constrained
- Moderately-constrained
- Inferred
- Alquist-Priolo Fault Zones

N

0 2.5 5

Miles

1:500,000

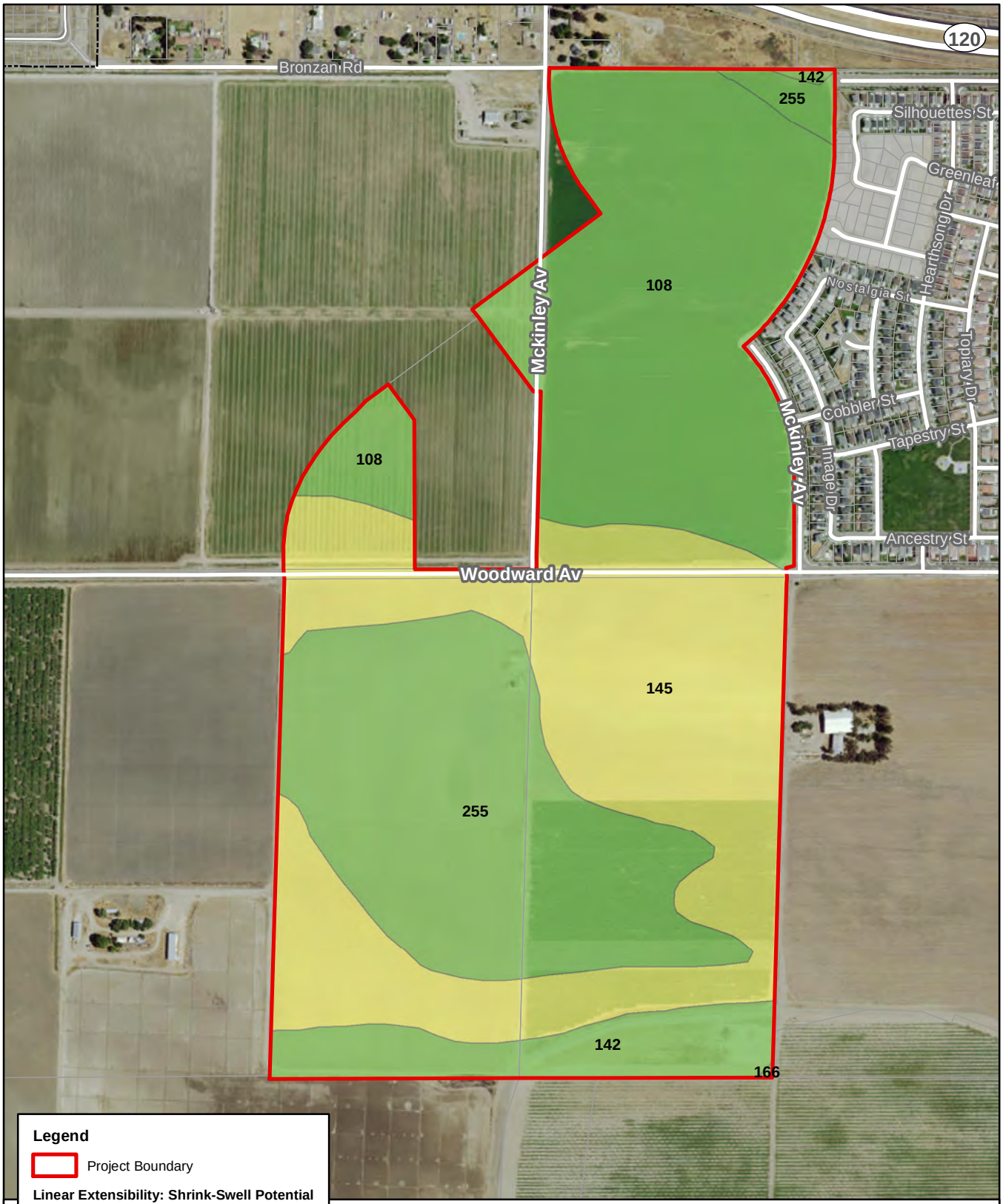
Data sources: US Geologic Survey; San Joaquin County GIS; ESRI Streetmap North America. Map date: July 18, 2016.

OAKWOOD LANDING

Figure 3.6-1. Known Faults in Project Area

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Legend

Project Boundary

Linear Extensibility: Shrink-Swell Potential

0.1-0.4%: Low Potential

0.0-2.9%: Low Potential

Shrink-swell potential is determined by the "linear extensibility" of the soil. Linear extenisbility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change and is reported as a percent change for the whole soil. Shrink-swell potential is low if the soil has a linear extensibility of less than 3%; moderate if 3-6%; high if 6-9%; and very high if greater than 9%. The map is labeled by soil type and may be cross-referenced with Figure 3.2-2.

N

0 250 500

Feet

1:9,000

Sources: San Joaquin County GIS; NRCS Web Soil Survey, San Joaquin County, California (CA077), v9, 9-22-2015. Map date: July 18, 2016.

OAKWOOD LANDING

Figure 3.6-2: Expansive Soils Map

De Novo Planning Group

A Land Use Planning, Design, and Environmental Firm

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This section discusses regional greenhouse gas (GHG) emissions, climate change, and energy conservation impacts that could result from implementation of the proposed Project. The analysis contained in this section is intended to be at a Project-level, and covers impacts associated with the conversion of the entire site to urban uses. This section provides a background discussion of greenhouse gases and climate change linkages and effects of global climate change. This section is organized with an existing setting, regulatory setting, approach/methodology, and impact analysis. The analysis and discussion of the GHG, climate change, and energy conservation impacts in this section focuses on the proposed Project's consistency with local, regional, and statewide climate change planning efforts and discusses the context of these planning efforts as they relate to the proposed Project. Disclosure and discussion of the Project's estimated energy usage and greenhouse gas emissions are provided. There were no comments received during the NOP scoping process related to this environmental topic.

3.7.1 ENVIRONMENTAL SETTING

GREENHOUSE GASES AND CLIMATE CHANGE LINKAGES

Various gases in the Earth's atmosphere, classified as atmospheric GHGs, play a critical role in determining the Earth's surface temperature. Solar radiation enters Earth's atmosphere from space, and a portion of the radiation is absorbed by the Earth's surface. The Earth emits this radiation back toward space, but the properties of the radiation change from high-frequency solar radiation to lower-frequency infrared radiation.

Naturally occurring GHGs include water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and ozone (O_3). Several classes of halogenated substances that contain fluorine, chlorine, or bromine are also GHGs, but they are, for the most part, solely a product of industrial activities. Although the direct GHGs, including CO_2, CH_4, and N_2O, occur naturally in the atmosphere, human activities have changed their atmospheric concentrations. From the pre-industrial era (i.e., ending about 1750) to 2011, concentrations of these three GHGs have increased globally by 40, 150, and 20 percent, respectively (IPCC, 2013).

Greenhouse gases, which are transparent to solar radiation, are effective in absorbing infrared radiation. As a result, this radiation that otherwise would have escaped back into space is now retained, resulting in a warming of the atmosphere. This phenomenon is known as the greenhouse effect. Among the prominent GHGs contributing to the greenhouse effect are carbon dioxide (CO_2), methane (CH_4), ozone (O_3), water vapor, nitrous oxide (N_2O), and chlorofluorocarbons (CFCs).

Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the industrial/manufacturing, utility, transportation, residential, and agricultural sectors. In California, the transportation sector is the largest emitter of GHGs, followed by the industrial sector (California Energy Commission, 2016).

As the name implies, global climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and toxic air contaminants, which are pollutants of regional and local

concern, respectively. California produced 441 million gross metric tons of carbon dioxide equivalents (MMTCO2e) in 2014 (California Energy Commission, 2016). By 2020, estimated business-as-usual greenhouse gas emissions in California are projected to be 509 $MMTCO_2e$ per year (California Air Resources Board, 2015).

Carbon dioxide equivalents are a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect. This potential, known as the global warming potential of a GHG, is also dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. Expressing GHG emissions in carbon dioxide equivalents takes the contribution of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted.

Consumption of fossil fuels in the transportation sector was the single largest source of California's GHG emissions in 2014, accounting for 37% of total GHG emissions in the state. This category was followed by the industrial sector (24%), the electricity generation sector (including both in-state and out of-state sources) (20%) and the agriculture sector (8%) (California Energy Commission, 2016).

EFFECTS OF GLOBAL CLIMATE CHANGE

The effects of increasing global temperature are far-reaching and extremely difficult to quantify. The scientific community continues to study the effects of global climate change. In general, increases in the ambient global temperature as a result of increased GHGs are anticipated to result in rising sea levels, which could threaten coastal areas through accelerated coastal erosion, threats to levees and inland water systems and disruption to coastal wetlands and habitat.

If the temperature of the ocean warms, it is anticipated that the winter snow season would be shortened. Snowpack in the Sierra Nevada provides both water supply (runoff) and storage (within the snowpack before melting), which is a major source of supply for the state. The snowpack portion of the supply could potentially decline by 70 to 90 percent by the end of the 21st century (Cal EPA, 2006).[1] This phenomenon could lead to significant challenges securing an adequate water supply for a growing state population. Further, the increased ocean temperature could result in increased moisture flux into the state; however, since this would likely increasingly come in the form of rain rather than snow in the high elevations, increased precipitation could lead to increased potential and severity of flood events, placing more pressure on California's levee/flood control system.

Sea level has risen approximately seven inches during the last century and it is predicted to rise more in the future. Some estimates anticipate a rise of an additional 22 to 35 inches by 2100, depending on the future GHG emissions levels (Cal EPA, 2006). A recent estimate (2013) by the Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT) anticipates that

[1] California Environmental Protection Agency, Climate Action Team. 2006. Climate Action Team Report to Governor Schwarzenegger and the Legislature. http://www.climatechange.ca.gov/climate_action_team/reports/.

sea-levels south of the Cape Mendocino could rise between 16.56 inches (1.38 ft) to 65.76 inches (5.48 ft). If this occurs, resultant effects could include increased coastal flooding, saltwater intrusion and disruption of wetlands (Cal EPA, 2006). As the existing climate throughout California changes over time, mass migration of species, or failure of species to migrate in time to adapt to the perturbations in climate, could also result. Under the emissions scenarios of the Climate Scenarios report (Cal EPA, 2006), the impacts of global warming in California are anticipated to include, but are not limited to, the following.

Public Health

Higher temperatures are expected to increase the frequency, duration, and intensity of conditions conducive to air pollution formation. For example, days with weather conducive to ozone formation are projected to increase from 25% to 35% under the lower warming range and to 75% to 85% under the medium warming range. In addition, if global background ozone levels increase as predicted in some scenarios, it may become impossible to meet local air quality standards. Air quality could be further compromised by increases in wildfires, which emit fine particulate matter that can travel long distances depending on wind conditions. The Climate Scenarios report indicates that large wildfires could become up to 55% more frequent if GHG emissions are not significantly reduced.

In addition, under the higher warming scenario, there could be up to 100 more days per year with temperatures above 90°F in Los Angeles and 95°F in Sacramento by 2100. This is a large increase over historical patterns and approximately twice the increase projected if temperatures remain within or below the lower warming range. Rising temperatures will increase the risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat.

Water Resources

A vast network of man-made reservoirs and aqueducts capture and transport water throughout the state from northern California rivers and the Colorado River. The current distribution system relies on Sierra Nevada snow pack to supply water during the dry spring and summer months. Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snow pack, increasing the risk of summer water shortages.

The state's water supplies are also at risk from rising sea levels. An influx of saltwater would degrade California's estuaries, wetlands, and groundwater aquifers. Saltwater intrusion caused by rising sea levels is a major threat to the quality and reliability of water within the southern edge of the Sacramento/San Joaquin River Delta, a major state fresh water supply. Global warming is also projected to seriously affect agricultural areas, with California farmers projected to lose as much as 25% of the water supply they need; decrease the potential for hydropower production within the state (although the effects on hydropower are uncertain); and seriously harm winter tourism. Under the lower warming range, the snow dependent winter recreational season at lower elevations could be reduced by as much as one month. If temperatures reach the higher warming

range and precipitation declines, there might be many years with insufficient snow for skiing, snowboarding, and other snow dependent recreational activities.

If GHG emissions continue unabated, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snow pack by as much as 70% to 90%. Under the lower warming scenario, snow pack losses are expected to be only half as large as those expected if temperatures were to rise to the higher warming range. How much snow pack will be lost depends in part on future precipitation patterns, the projections for which remain uncertain. However, even under the wetter climate projections, the loss of snow pack would pose challenges to water managers, hamper hydropower generation, and nearly eliminate all skiing and other snow-related recreational activities.

Agriculture

Increased GHG emissions are expected to cause widespread changes to the agriculture industry reducing the quantity and quality of agricultural products statewide. Although higher carbon dioxide levels can stimulate plant production and increase plant water-use efficiency, California's farmers will face greater water demand for crops and a less reliable water supply as temperatures rise.

Plant growth tends to be slow at low temperatures, increasing with rising temperatures up to a threshold. However, faster growth can result in less-than-optimal development for many crops, so rising temperatures are likely to worsen the quantity and quality of yield for a number of California's agricultural products. Products likely to be most affected include wine grapes, fruits and nuts, and milk.

Crop growth and development will be affected, as will the intensity and frequency of pest and disease outbreaks. Rising temperatures will likely aggravate ozone pollution, which makes plants more susceptible to disease and pests and interferes with plant growth.

In addition, continued global warming will likely shift the ranges of existing invasive plants and weeds and alter competition patterns with native plants. Range expansion is expected in many species while range contractions are less likely in rapidly evolving species with significant populations already established. Should range contractions occur, it is likely that new or different weed species will fill the emerging gaps. Continued global warming is also likely to alter the abundance and types of many pests, lengthen pests' breeding season, and increase pathogen growth rates.

Forests and Landscapes

Global warming is expected to alter the distribution and character of natural vegetation thereby resulting in a possible increased risk of large of wildfires. If temperatures rise into the medium warming range, the risk of large wildfires in California could increase by as much as 55%, which is almost twice the increase expected if temperatures stay in the lower warming range. However, since wildfire risk is determined by a combination of factors, including precipitation, winds, temperature, and landscape and vegetation conditions, future risks will not be uniform throughout

the state. For example, if precipitation increases as temperatures rise, wildfires in southern California are expected to increase by approximately 30% toward the end of the century. In contrast, precipitation decreases could increase wildfires in northern California by up to 90%.

Moreover, continued global warming will alter natural ecosystems and biological diversity within the state. For example, alpine and sub-alpine ecosystems are expected to decline by as much as 60% to 80% by the end of the century as a result of increasing temperatures. The productivity of the state's forests is also expected to decrease as a result of global warming.

Rising Sea Levels

Rising sea levels, more intense coastal storms, and warmer water temperatures will increasingly threaten the state's coastal regions. Under the higher warming scenario, sea level is anticipated to rise between 16.56 inches (1.38 ft) to 65.76 inches (5.48 ft) by 2100. Elevations of this magnitude would inundate coastal areas with saltwater, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats.

ENERGY CONSUMPTION

Energy is California is consumed from a wide variety of sources. Fossil fuels (including gasoline and diesel fuel, natural gas, and energy used to generate electricity) are most widely used form of energy in the State. However, renewable source of energy (such as solar and wind) are growing in proportion to California's overall energy mix. A large driver of renewable sources of energy in California is the State's current Renewable Portfolio Standard (RPS), which requires the State to derive at least 33% of electricity generated from renewable resources by 2020, and 50 percent by 2030.

Overall, in 2013, California ranked as the third-most energy efficient state in the nation (U.S. EIA, 2016). California's per capita rate of energy usage has remained relatively constant since the 1970's. Many State regulations since the 1970's, including new building energy efficiency standards, vehicle fleet efficiency measures, as well as growing public awareness, have helped to keep per capita energy usage in the State in check.

The consumption of nonrenewable energy (primarily gasoline and diesel fuel) associated with the operation of passenger, public transit, and commercial vehicles results in GHG emissions that ultimately result in global climate change. Alternative fuels such as natural gas, ethanol, and electricity (unless derived from solar, wind, nuclear, or other energy sources that do not produce carbon emissions) also result in GHG emissions and contribute to global climate change.

Electricity Consumption

California relies on a regional power system composed of a diverse mix of natural gas, renewable, hydroelectric, and nuclear generation resources. Approximately 71 percent of the electrical power needed to meet California's demand is produced in the state. Approximately 29 percent of its electricity demand is imported from the Pacific Northwest and the Southwest (California Energy

Commission, 2012)[2]. In 2010, California's in-state generated electricity was derived from natural gas (53.4 percent), large hydroelectric resources (14.6 percent), coal (1.7 percent), nuclear sources (15.7 percent), and renewable resources that include geothermal, biomass, small hydroelectric resources, wind, and solar (14.6 percent) (California Energy Commission, 2012).

According to the California Energy Commission (CEC), total statewide electricity consumption increased from 166,979 gigawatt-hours (GWh) in 1980 to 228,038 GWh in 1990, which is an estimated annual growth rate of 3.66 percent. The statewide electricity consumption in 1997 was 246,225 GWh, reflecting an annual growth rate of 1.14 percent between 1990 and 1997 (California Energy Commission Energy Almanac, 2012). Statewide consumption was 274,985 GWh in 2010, an annual growth rate of 0.9 percent between 1997 and 2010.

Oil

The primary energy source for the United States is oil, which is refined to produce fuels like gasoline, diesel, and jet fuel. Oil is a finite, nonrenewable energy source. World consumption of petroleum products has grown steadily in the last several decades. As of 2009, world consumption of oil had reached 96 million barrels per day. The United States, with approximately five percent of the world's population, accounts for approximately 19 percent of world oil consumption, or approximately 18.6 million barrels per day (The World Factbook 2009, Washington, DC: Central Intelligence Agency, 2009). The transportation sector relies heavily on oil. In California, petroleum based fuels currently provide approximately 96 percent of the state's transportation energy needs (California Energy Commission, 2012).

Natural Gas/Propane

The state produces approximately 12 percent of its natural gas, while obtaining 22 percent from Canada and 65 percent from the Rockies and the Southwest (California Energy Commission, 2012). In 2006, California produced 325.6 billion cubic feet of natural gas (California Energy Commission, 2012).

3.7.2 REGULATORY SETTING

FEDERAL

Clean Air Act

The Federal Clean Air Act (FCAA) was first signed into law in 1970. In 1977, and again in 1990, the law was substantially amended. The FCAA is the foundation for a national air pollution control effort, and it is composed of the following basic elements: NAAQS for criteria air pollutants, hazardous air pollutant standards, state attainment plans, motor National Ambient Air Quality Standards (NAAQS) vehicle emissions standards, stationary source emissions standards and permits, acid rain control measures, stratospheric ozone protection, and enforcement provisions.

[2] California Energy Commission (2012). Energy Almanac. Retrieved August 2012, from http://energyalmanac.ca.gov/overview/index.html.

The EPA is responsible for administering the FCAA. The FCAA requires the EPA to set NAAQS for several problem air pollutants based on human health and welfare criteria. Two types of NAAQS were established: primary standards, which protect public health, and secondary standards, which protect the public welfare from non-health-related adverse effects such as visibility reduction.

Energy Policy and Conservation Act

The Energy Policy and Conservation Act of 1975 sought to ensure that all vehicles sold in the U.S. would meet certain fuel economy goals. Through this Act, Congress established the first fuel economy standards for on-road motor vehicles in the United States. Pursuant to the Act, the National Highway Traffic and Safety Administration, which is part of the U.S. Department of Transportation (USDOT), is responsible for establishing additional vehicle standards and for revising existing standards.

Since 1990, the fuel economy standard for new passenger cars has been 27.5 mpg. Since 1996, the fuel economy standard for new light trucks (gross vehicle weight of 8,500 pounds or less) has been 20.7 mpg. Heavy-duty vehicles (i.e., vehicles and trucks over 8,500 pounds gross vehicle weight) are not currently subject to fuel economy standards. Compliance with federal fuel economy standards is determined on the basis of each manufacturer's average fuel economy for the portion of its vehicles produced for sale in the U.S. The Corporate Average Fuel Economy (CAFE) program, which is administered by the EPA, was created to determine vehicle manufacturers' compliance with the fuel economy standards. The EPA calculates a CAFE value for each manufacturer based on city and highway fuel economy test results and vehicle sales. Based on the information generated under the CAFE program, the USDOT is authorized to assess penalties for noncompliance.

Energy Policy Act of 1992 (EPAct)

The Energy Policy Act of 1992 (EPAct) was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAct requires certain federal, state, and local government and private fleets to purchase a percentage of light duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are included in EPAct. Federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the act to consider a variety of incentive programs to help promote AFVs.

Energy Policy Act of 2005

The Energy Policy Act of 2005 was signed into law on August 8, 2005. Generally, the act provides for renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for a clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

Intermodal Surface Transportation Efficiency Act (ISTEA)

ISTEA (49 U.S.C. § 101 et seq.) promoted the development of intermodal transportation systems to maximize mobility as well as address national and local interests in air quality and energy. ISTEA contained factors that metropolitan planning organizations (MPOs), such as the San Joaquin Council of Governments (SJCOG), were to address in developing transportation plans and programs, including some energy-related factors. To meet the ISTEA requirements, MPOs adopted explicit policies defining the social, economic, energy, and environmental values that were to guide transportation decisions in that metropolitan area. The planning process was then to address these policies. Another requirement was to consider the consistency of transportation planning with federal, state, and local energy goals. Through this requirement, energy consumption was expected to become a criterion, along with cost and other values that determine the best transportation solution.

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)

SAFETEA-LU (23 U.S.C. § 507), renewed the Transportation Equity Act for the 21st Century (TEA-21) of 1998 (23 U.S.C.; 49 U.S.C.) through FY 2009. SAFETEA-LU authorized the federal surface transportation programs for highways, highway safety, and transit. SAFETEA-LU addressed the many challenges facing our transportation system today—such as improving safety, reducing traffic congestion, improving efficiency in freight movement, increasing intermodal connectivity, and protecting the environment—as well as laying the groundwork for addressing future challenges. SAFETEA-LU promoted more efficient and effective federal surface transportation programs by focusing on transportation issues of national significance, while giving state and local transportation decision makers more flexibility to solve transportation problems in their communities. SAFETEA-LU was extended in March of 2010 for nine months, and expired in December of the same year. In June 2012, SAFETEA-LU was replaced by the Moving Ahead for Progress in the 21st Century Act (MAP-21), which will take effect October 1, 2012.

Federal Climate Change Policy

According to the EPA, "the United States government has established a comprehensive policy to address climate change" that includes slowing the growth of emissions; strengthening science, technology, and institutions; and enhancing international cooperation. To implement this policy, "the Federal government is using voluntary and incentive-based programs to reduce emissions and has established programs to promote climate technology and science." The federal government's goal is to reduce the GHG intensity (a measurement of GHG emissions per unit of economic activity) of the American economy by 18 percent over the 10-year period from 2002 to 2012. In addition, the EPA administers multiple programs that encourage voluntary GHG reductions, including "ENERGY STAR", "Climate Leaders", and Methane Voluntary Programs. However, as of this writing, there are no adopted federal plans, policies, regulations, or laws directly regulating GHG emissions.

Mandatory Greenhouse Gas Reporting Rule

On September 22, 2009, EPA issued a final rule for mandatory reporting of GHGs from large GHG emissions sources in the United States. In general, this national reporting requirement will provide EPA with accurate and timely GHG emissions data from facilities that emit 25,000 metric tons or more of CO_2 per year. This publically available data will allow the reporters to track their own emissions, compare them to similar facilities, and aid in identifying cost effective opportunities to reduce emissions in the future. Reporting is at the facility level, except that certain suppliers of fossil fuels and industrial greenhouse gases along with vehicle and engine manufacturers will report at the corporate level. An estimated 85% of the total U.S. GHG emissions, from approximately 10,000 facilities, are covered by this final rule.

STATE

Assembly Bill 1493

In response to AB 1493, CARB approved amendments to the California Code of Regulations (CCR) adding GHG emission standards to California's existing motor vehicle emission standards. Amendments to CCR Title 13 Sections 1900 (CCR 13 1900) and 1961 (CCR 13 1961), and adoption of Section 1961.1 (CCR 13 1961.1) require automobile manufacturers to meet fleet average GHG emission limits for all passenger cars, light-duty trucks within various weight criteria, and medium-duty passenger vehicle weight classes beginning with the 2009 model year. Emission limits are further reduced each model year through 2016. For passenger cars and light-duty trucks 3,750 pounds or less loaded vehicle weight (LVW), the 2016 GHG emission limits are approximately 37 percent lower than during the first year of the regulations in 2009. For medium-duty passenger vehicles and light-duty trucks 3,751 LVW to 8,500 pounds gross vehicle weight (GVW), GHG emissions are reduced approximately 24 percent between 2009 and 2016.

CARB requested a waiver of federal preemption of California's Greenhouse Gas Emissions Standards. The intent of the waiver is to allow California to enact emissions standards to reduce carbon dioxide and other greenhouse gas emissions from automobiles in accordance with the regulation amendments to the CCRs that fulfill the requirements of AB 1493. The EPA granted a waiver to California to implement its greenhouse gas emissions standards for cars.

Assembly Bill 1007

Assembly Bill 1007, (Pavley, Chapter 371, Statutes of 2005) directed the CEC to prepare a plan to increase the use of alternative fuels in California. As a result, the CEC prepared the State Alternative Fuels Plan in consultation with the state, federal, and local agencies. The plan presents strategies and actions California must take to increase the use of alternative non-petroleum fuels in a manner that minimizes costs to California and maximizes the economic benefits of in-state production. The Plan assessed various alternative fuels and developed fuel portfolios to meet California's goals to reduce petroleum consumption, increase alternative fuels use, reduce greenhouse gas emissions, and increase in-state production of biofuels without causing a significant degradation of public health and environmental quality.

Bioenergy Action Plan – Executive Order #S-06-06

Executive Order #S-06-06 establishes targets for the use and production of biofuels and biopower and directs state agencies to work together to advance biomass programs in California while providing environmental protection and mitigation. The executive order establishes the following target to increase the production and use of bioenergy, including ethanol and biodiesel fuels made from renewable resources: produce a minimum of 20 percent of its biofuels within California by 2010, 40 percent by 2020, and 75 percent by 2050. The executive order also calls for the state to meet a target for use of biomass electricity.

California Executive Orders S-3-05 and S-20-06, and Assembly Bill 32

On June 1, 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05. The goal of this Executive Order is to reduce California's GHG emissions to: 1) 2000 levels by 2010, 2) 1990 levels by the 2020 and 3) 80% below the 1990 levels by the year 2050.

In 2006, this goal was further reinforced with the passage of Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006. AB 32 sets the same overall GHG emissions reduction goals while further mandating that CARB create a plan, which includes market mechanisms, and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." Executive Order S-20-06 further directs state agencies to begin implementing AB 32, including the recommendations made by the state's Climate Action Team.

EO S-13-08

EO S-13-08 was issued on November 14, 2008. The EO is intended to hasten California's response to the impacts of global climate change, particularly sea level rise, and directs state agencies to take specified actions to assess and plan for such impacts, including requesting the National Academy of Sciences to prepare a Sea Level Rise Assessment Report, directing the Business, Transportation, and Housing Agency to assess the vulnerability of the State's transportation systems to sea level rise, and requiring the Office of Planning and Research and the Natural Resources Agency to provide land use planning guidance related to sea level rise and other climate change impacts.

The order also required State agencies to develop adaptation strategies to respond to the impacts of global climate change that are predicted to occur over the next 50 to 100 years. The adaption strategies report summarizes key climate change impacts to the State for the following areas: public health; ocean and coastal resources; water supply and flood protection; agriculture; forestry; biodiversity and habitat; and transportation and energy infrastructure. The report recommends strategies and specific responsibilities related to water supply, planning and land use, public health, fire protection, and energy conservation.

Assembly Bill 32 - Climate Change Scoping Plan

2008 Climate Change Scoping Plan: On December 11, 2008 ARB adopted its *Climate Change Scoping Plan* (2008 Scoping Plan), which functions as a roadmap of ARB's plans to achieve GHG reductions in California required by AB 32 through subsequently enacted regulations. The 2008

Scoping Plan contains the main strategies California has implemented to reduce CO_2e emissions by 169 million metric tons (MMT), or approximately 30 percent, from the state's projected 2020 emissions level of 596 MMT of CO_2e under a business-as-usual scenario. (This is a reduction of 42 MMT CO_2e, or almost 10 percent, from 2002–2004 average emissions, but requires the reductions in the face of population and economic growth through 2020.) The 2008 Scoping Plan also breaks down the amount of GHG emissions reductions ARB recommends for each emissions sector of the state's GHG inventory. The 2008 Scoping Plan calls for the largest reductions in GHG emissions to be achieved by implementing the following measures and standards:

- improved emissions standards for light-duty vehicles (estimated reductions of 31.7 MMT CO_2e),
- the Low-Carbon Fuel Standard (15.0 MMT CO_2e),
- energy efficiency measures in buildings and appliances and the widespread development of combined heat and power systems (26.3 MMT CO_2e), and
- a renewable portfolio standard for electricity production (21.3 MMT CO_2e).

First Update to the Climate Change Scoping Plan: In June 2013, CARB kicked off a public process intended develop the First Update to the Climate Change Scoping Plan (2014 Scoping Plan). The public process included: regional workshops, input/advise from stakeholders, advise from the Environmental Justice Advisory Committee, public review and comment of a draft Scoping Plan, and ultimately public hearings. On May 22, 2014, the First Update to the Climate Change Scoping Plan was approved by the Board.

The 2014 Scoping Plan indicates that California is on track to meet the near-term 2020 greenhouse gas limit and is well positioned to maintain and continue reductions beyond 2020 as required by AB 32. The set of actions the State is taking is driving down greenhouse emissions and moving the State steadily in the direction of a cleaner energy economy. For instance, the 2014 Scoping Plan indicates that currently, about 23 percent of the State's electricity comes from renewable power and that this will increase to at least 33 percent by 2020 under new requirements set in place in 2011. The 2014 Scoping Plan indicates that collectively, the State's set of vehicle, fuels, and land use policies will cut in half emissions from passenger transportation and drivers' fuel costs over the next 20 years. The 2014 Scoping Plan cites California's Low Carbon Fuel Standard (LCFS) and California's vehicle GHG standards (Pavley) as two standards that have, and will continue to, dramatically scale up emission reductions in the future. The 2014 Scoping Plan cites work by regulators on developing a national GHG standard and corresponding fuel efficiency standard for medium- and heavy-duty trucks as well as California's pioneering zero emission vehicles (ZEV) regulation as areas where California is making major strides toward reducing the future GHG emission. The 2014 Scoping Plan indicates that seven Metropolitan Planning Organizations have adopted Sustainable Community Strategies that are intended to help drive GHG emission reductions, by creating more livable communities that offer greater housing and transportation options; improved access to resources and services; safer, more vibrant neighborhoods; and healthier lifestyles where people can live, work, and play without having to travel long distances or sit through congestion. Lastly, the 2014 Scoping Plan cites the Cap-and-Trade Program launched by California, as a program that will ensure that California remains on track to continually reduce

emissions and meet the 2020 limit and play a critical role in keeping California on the right emissions reduction trajectory to meet ongoing reduction targets at the lowest possible cost.

California Strategy to Reduce Petroleum Dependence (AB 2076)

In response to the requirements of AB 2076 (Chapter 936, Statutes of 2000), the CEC and the CARB developed a strategy to reduce petroleum dependence in California. The strategy, *Reducing California's Petroleum Dependence*, was adopted by the CEC and CARB in 2003. The strategy recommends that California reduce on-road gasoline and diesel fuel demand to 15 percent below 2003 demand levels by 2020 and maintain that level for the foreseeable future; the Governor and Legislature work to establish national fuel economy standards that double the fuel efficiency of new cars, light trucks, and sport utility vehicles (SUVs); and increase the use of non- petroleum fuels to 20 percent of on-road fuel consumption by 2020 and 30 percent by 2030.

Climate Action Program at Caltrans

The California Department of Transportation, Business, Transportation, and Housing Agency, prepared a Climate Action Program in response to new regulatory directives. The goal of the Climate Action Program is to promote clean and energy efficient transportation, and provide guidance for mainstreaming energy and climate change issues into business operations. The overall approach to lower fuel consumption and CO_2 from transportation is twofold: (1) reduce congestion and improve efficiency of transportation systems through smart land use, operational improvements, and Intelligent Transportation Systems; and (2) institutionalize energy efficiency and GHG emission reduction measures and technology into planning, project development, operations, and maintenance of transportation facilities, fleets, buildings, and equipment.

The reasoning underlying the Climate Action Program is the conclusion that "the most effective approach to addressing GHG reduction, in the short-to-medium term, is strong technology policy and market mechanisms to encourage innovations. Rapid development and availability of alternative fuels and vehicles, increased efficiency in new cars and trucks (light and heavy duty), and super clean fuels are the most direct approach to reducing GHG emissions from motor vehicles (emission performance standards and fuel or carbon performance standards)."

Governor's Low Carbon Fuel Standard (Executive Order #S-01-07)

Executive Order #S-01-07 establishes a statewide goal to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020 through establishment of a Low Carbon Fuel Standard. The Low Carbon Fuel Standard is incorporated into the State Alternative Fuels Plan and is one of the proposed discrete early action GHG reduction measures identified by CARB pursuant to AB 32.

Senate Bill 97 (SB 97)

Senate Bill 97 (Chapter 185, 2007) required the Governor's Office of Planning and Research (OPR) to develop recommended amendments to the State California Environmental Quality Act (CEQA) Guidelines for addressing greenhouse gas emissions. OPR prepared its recommended amendments to the State CEQA Guidelines to provide guidance to public agencies regarding the analysis and

mitigation of greenhouse gas emissions and the effects of greenhouse gas emissions in draft CEQA documents. The Amendments became effective on March 18, 2010.

Senate Bill 375 (SB 375)

Sen. Bill No. 375 (Stats. 2008, ch. 728) (SB 375) was built on AB 32 (California's 2006 climate change law). SB 375's core provision is a requirement for regional transportation agencies to develop a Sustainable Communities Strategy (SCS) in order to reduce GHG emissions from passenger vehicles. The SCS is one component of the Regional Transportation Plan (RTP).

The SCS outlines the region's plan for combining transportation resources, such as roads and mass transit, with a realistic land use pattern, in order to meet a state target for reducing GHG emissions. The strategy must take into account the region's housing needs, transportation demands, and protection of resource and farmlands.

Additionally, SB 375 modified the state's Housing Element Law to achieve consistency between the land use pattern outlined in the SCS and the Regional Housing Needs Assessment allocation. The legislation also substantially improved cities' and counties' accountability for carrying out their housing element plans.

Finally, SB 375 amended CEQA (Pub. Resources Code, § 21000 et seq.) to ease the environmental review of developments that help reduce the growth of GHG emissions.

Senate Bill 32 (SB 32)

Senate Bill 32, which passed into law in 2016, sets the target of reducing greenhouse gas emissions to 40 percent below the 1990 level by the year 2030. SB 32 extends the original set of greenhouse gas targets provided by the passage of AB 32 (the Global Warmings Solutions Act of 2006). This new target sets an aggressive goalpost, helping the State along its pathway to achieve its longer term goal of an 80 percent reduction in greenhouse gas emissions by the year 2050.

California Building Energy Efficiency Standards

Title 24, Part 6 of the California Code of Regulations, known as the Building Energy Efficiency Standards, was established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. On January 1, 2010, the California Building Standards Commission adopted CALGreen and became the first state in the United States to adopt a statewide green building standards code. CALGreen requires new buildings to reduce water consumption by 20 percent, divert 50 percent of construction waste from landfills, and install low pollutant-emitting materials.

CEQA Guidelines Appendix F

In order to assure that energy implications are considered in project decisions, CEQA requires that EIRs include a discussion of the potential energy impacts of proposed projects, with particular

emphasis on avoiding or reducing inefficient, wasteful and unnecessary consumption of energy. The goal of conserving energy implies the wise and efficient use of energy.

LOCAL

San Joaquin Valley Air Pollution Control District Climate Change Action Plan

In August 2008, the SJVAPCD adopted its Climate Change Action Plan. The Climate Change Action Plan directed the SJVAPCD's Air Pollution Control Officer to develop guidance to assist APCD staff, Valley businesses, land use agencies and other permitting agencies in addressing GHG emissions as part of the CEQA process. Regarding CEQA guidance, some of the goals of the Climate Change Action Plan are to assist local land use agencies, developers and the public by identifying and quantifying GHG emission reduction measures for development projects and by providing tools to streamline evaluation of project-specific GHG effects, and to assist Valley businesses in complying with State law related to GHG emissions.

A product of this direction to provide CEQA guidance is the Final Staff Report – Climate Change Action Plan: Addressing GHG Emissions Impacts, presented to the APCD Board in December 2009. A central component of the Final Staff Report is the establishment of Best Performance Standards, which are specifications or project design elements that identify effective, feasible GHG emission reduction measures. Emission reductions achieved through Best Performance Standards implementation would be pre-quantified, thus negating the need for project-specific quantification of GHG emissions.

For projects not implementing Best Performance Standards, demonstration of a 29% reduction in GHG emissions from business-as-usual conditions is required to determine that a project would have a less than cumulatively significant impact. Appendix J of the Final Staff Report provides a table of GHG emission reduction measures for development projects, along with a point value that corresponds to a percentage decrease in GHG emissions when available.

2014 Regional Transportation Plan/Sustainable Communities Strategy

The 2014 San Joaquin County Regional Transportation Plan, which has been named “Valley Visions San Joaquin,” will be the first RTP in San Joaquin County to contain a SCS, the result of the Sustainable Communities and Climate Protection Act of 2008 (i.e., SB 375). The SCS will coordinate future transportation investments and land use strategies to prioritize a multi-modal investment plan covering a 27-year period extending out to 2040.

The RTP is a long-range transportation plan that guides the region’s transportation improvements over a minimum of 20-years and is updated every four. Using growth forecasts and economic trends projected out over study timeframe, the RTP considers the role of transportation in the broader context of economic, environmental, and quality-of-life goals for the future, identifying regional transportation strategies to address our mobility needs. The 2014 RTP will address all transportation modes including motor vehicles, transit (commuter and local), rail (commuter and inter-regional), goods movement (rail, truck, and water), bicycle and pedestrian facilities, aviation

systems, transportation systems management (TSM) and transportation demand management (TDM) programs, and other projects considered over the planning horizon of 2040. Regional transportation improvement projects proposed to be funded, in whole or in part, in the state transportation improvement program must be included in the adopted RTP.

The eight counties of the San Joaquin Valley are coordinating on some aspects of these planning efforts to maximize resources, with each area's Metropolitan Planning Organization (MPO) developing a separate plan. MPOs are responsible for setting transportation policy and priorities for a region and documenting how transportation funds will be spent in a Regional Transportation Plan. Specifically, the San Joaquin County SCS will:

- Identify the general location of uses, residential densities, and building intensities within the region
- Identify areas within the region sufficient to house an eight-year projection of the regional housing need for the region
- Gather and consider the best practically available scientific information regarding resource areas and farmland in the region
- Set forth a forecasted development pattern for the region
- Identify areas within the region sufficient to house all the population of the region
- Identify a transportation network to service the transportation needs of the region
- Quantify the reduction in greenhouse gas emissions projected to be achieved by the SCS

The Greenhouse Gas Reduction Targets for the 2014 San Joaquin County RTP are as follows:

- 5% per capita reduction from 2005 levels by 2020
- 10% per capita reduction from 2005 levels by 2035

City of Manteca Climate Action Plan

The City of Manteca Climate Action Plan (2013) contains an inventory of GHG emissions, reduction strategies, and a means to implement, monitor, and fund the Plan. The purpose of the Climate Action Plan is to:

- Outline a course of action for the City government and the community of Manteca to reduce per capita greenhouse gas emissions by amounts required to show consistency with AB 32 goals for the year 2020 and adapt to effects of climate change, and
- Provide clear guidance to City staff regarding when and how to implement key provisions of the Climate Action Plan.
- Provide a streamlined mechanism for projects that are consistent with the CAP to demonstrate that they would not contribute significant greenhouse gas impacts.

3.7.3 IMPACTS AND MITIGATION MEASURES

GREENHOUSE GAS EMISSIONS THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, climate change-related impacts are considered significant if implementation of the proposed Project would do any of the following:

1. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.
2. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

The vast majority of individual projects do not generate sufficient GHG emissions to create a project-specific impact through a direct influence to climate change; therefore, the issue of climate change typically involves an analysis of whether a project's contribution towards an impact is cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects (CEQA Guidelines, Section 15355).

The SJVAPCD's has evaluated different approaches for estimating impacts, and summarizing potential GHG emission reduction measures. The SJVAPCD staff has concluded that "*existing science is inadequate to support quantification of impacts that project specific GHG emissions have on global climatic change*." This is readily understood when one considers that global climatic change is the result of the sum total of GHG emissions, both man-made and natural that occurred in the past; that is occurring now; and will occur in the future. The effects of project specific GHG emissions are cumulative, and unless reduced or mitigated, their incremental contribution to global climatic change could be considered significant.

The *Final Draft Guidance for Assessing and Mitigating Air Quality Impacts* (SJVAPCD, 2015) provides an approach to assessing a Project's impacts on greenhouse gas emissions by evaluating the Project's emissions to the "reduction targets" established in ARB's AB 32 Scoping Plan. For instance, the SJVACD's guidance recommends that projects should demonstrate that "*project specific GHG emissions would be reduced or mitigated by at least 29%, compared to Business as Usual (BAU), including GHG emission reductions achieved since the 2002-2004 baseline period, consistent with GHG emission reduction targets established in ARB's AB 32 Scoping Plan. Projects achieving at least a 29% GHG emission reduction compared to BAU would be determined to have a less than significant individual and cumulative impact for GHG*."

Subsequent to the SJVAPCD's approval of the *Final Draft Guidance for Assessing and Mitigating Air Quality Impacts* (SJVAPCD 2015), the California Supreme Court issued an opinion that affects the conclusions that should/should not be drawn from a GHG emissions analysis that is based on consistency with the AB 32 Scoping Plan. More specifically, in *Center for Biological Diversity v. California Department of Fish and Wildlife*, the Court ruled that showing a "project-level reduction" that meets or exceeds the Scoping Plan's overall statewide GHG reduction goal is not necessarily sufficient to show that the project's GHG impacts will be adequately mitigated: "*the Scoping Plan*

nowhere related that statewide level of reduction effort to the percentage of reduction that would or should be required from individual projects..." According to the Court, the lead agency cannot simply assume that the overall level of effort required to achieve the statewide goal for emissions reductions will suffice for a specific project.

Given this Court decision, reliance on a 29 percent GHG emissions reduction from projected BAU levels compared to the Project's estimated 2020 levels as recommended in the SJVAPCD's guidance documents will not be the basis for an impact conclusion in this EIR. Given that the SJVAPCD staff has concluded that "*existing science is inadequate to support quantification of impacts that project specific GHG emissions have on global climatic change,*" this EIR will instead rely on a qualitative approach for this analysis.

The analysis will include an assessment of feasible Best Performance Standards (BPS) that can be incorporated into the Project design, and the resulting GHG emissions. The analysis will also review the Project for consistency with the RTP/SCS for the region, which is specifically designed to reduce GHG emissions in accordance with the ARB Scoping Plan. The analysis will still include a comparison of the projected BAU levels compared to the Project's estimated 2020 levels in order to determine the projected reduction for the Project. This qualitative approach will be used, in part because there are currently no numerical thresholds established by the SJVAPCD, and the SJVAPCD's *Climate Change Action Plan* (2008) and their guidance documents do not establish sufficient justification that a "project-level reduction" would meet or exceeds the Scoping Plan's overall statewide GHG reduction goal.

ENERGY CONSERVATION THRESHOLDS OF SIGNIFICANCE

Additionally, per Appendix F of the State CEQA Guidelines, the proposed Project would result in a significant impact on energy use if it would:

- Result in significant adverse impacts related to Project energy requirements, energy use inefficiencies, and/or energy intensiveness of materials by amount and fuel type for each stage of the Project including construction, operations, maintenance, and/or removal;
- Result in significant adverse impacts on local and regional energy supplies and on requirements for additional capacity;
- Result in significant adverse impacts on peak and base period demands for electricity and other forms of energy;
- Fail to comply with existing energy standards;
- Result in significant adverse impacts on energy resources;
- Result in significant adverse impacts related to transportation energy use requirements of the Project and use of transportation alternatives; or
- Conflict, or create an inconsistency, with any applicable plan, policy, or regulation adopted for the purpose of avoiding or mitigating environmental effects related to energy conservation.

In order to determine whether or not the proposed Project would result in a significant impact on energy use, this EIR includes an analysis of proposed Project energy use, provided below.

IMPACTS AND MITIGATION MEASURES

Impact 3.7-1: Potential to generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment or potential to conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases. (Significant and Unavoidable)

Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the industrial/manufacturing, utility, transportation, residential, and agricultural sectors. Therefore, the cumulative global emissions of GHGs contributing to global climate change can be attributed to every nation, region, and city, and virtually every individual on Earth. A project's GHG emissions are at a micro-scale relative to global emissions, but could result in a cumulatively considerable incremental contribution to a significant cumulative macro-scale impact. Implementation of the proposed Project would contribute to increases of GHG emissions that are associated with global climate change. Estimated GHG emissions attributable to future development would be primarily associated with increases of CO_2 and other GHG pollutants, such as methane (CH_4) and nitrous oxide (N_2O), from mobile sources and utility usage.

The proposed Project's short-term construction-related and long-term operational GHG emissions for Buildout of the proposed Project, were estimated using the California Emission Estimator Model (CalEEMod)^{TM} (v.2016.3.1). CalEEMod is a statewide model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify GHG emissions from land use projects. The model quantifies direct GHG emissions from construction and operation (including vehicle use), as well as indirect GHG emissions, such as GHG emissions from energy use, solid waste disposal, vegetation planting and/or removal, and water use. Emissions are expressed in annual metric tons of CO_2 equivalent units of measure (i.e., $MTCO_2e$), based on the global warming potential of the individual pollutants.

Short-Term Construction GHG Emissions: Estimated increases in GHG emissions associated with construction of the proposed Project are summarized in Table 3.7-1.

TABLE 3.7-1: CONSTRUCTION GHG EMISSIONS (UNMITIGATED METRIC TONS/YR)

YEAR	BIO-CO_2	NBIO-CO_2	TOTAL CO_2	CH_4	N_2O	CO_2E
2017	0.0000	538.5480	538.5480	0.1522	0.0000	542.3529
2018	0.0000	1,911.6645	1,911.6645	0.1773	0.0000	1,916.0959
2019	0.0000	1,866.5284	1,866.5284	0.1525	0.0000	1,870.3403
2020	0.0000	1,841.7800	1,841.7800	0.1442	0.0000	1,845.3844
2021	0.0000	947.4822	947.4822	0.0701	0.0000	949.2356
Maximum	**0.0000**	**1,911.6645**	**1,911.6645**	**0.1773**	**0.0000**	**1,916.0959**

SOURCE: CALEEMOD (V.2016.3.1).

As presented in the table, annual construction emissions of GHG associated with development of the Project are estimated to be a maximum of 1,916.0959 $MTCO_2e$ per year and a low of 542.3529 $MTCO_2e$ emitted during each of the construction years (2017 through 2021). These construction GHG emissions are a one-time release and are comparatively much lower than emissions associated with operational phases of a project. Cumulatively, these construction emissions would not generate a significant contribution to global climate change.

Long-Term Operational GHG Emissions: The long-term operational GHG emissions estimate for buildout of the proposed Project, incorporates the potential area source and vehicle emissions, and emissions associated with utility and water usage, and wastewater and solid waste generation. The modeling included mitigation inputs for the year 2019 including the following:

Traffic Mitigation

- Increase Density (4.9 dwelling units per acre)
- Improve Walkability Design (minimum 152 intersections per square mile)
- Improve Destination Accessibility (minimum distance to downtown is 2.9 miles)
- Increase Transit Accessibility in the Project area (minimum distance to transit stops is 0.9 miles)
- Improve Pedestrian Network so that the Project area connects to offsite pedestrian networks
- Provide traffic calming measures on at least 25% of street segments and intersections

Energy Mitigation

- Exceed Title 24 by 15%
- Install High Efficiency Lighting
- Install High Efficiency Appliances within buildings

Area Mitigation

- Use Low VOC Cleaning Supplies
- Use Only Natural Gas Hearths

Water Mitigation

- Apply a Water Conservation Strategy to achieve a 20% reduction in indoor and outdoor water usage
- Install low flow bathroom faucet
- Install low-flow kitchen faucet
- Install low-flow toilet
- Install low-flow shower
- Use water-efficient irrigation systems

Estimated GHG emissions associated with the buildout of the proposed Project with and without the above mitigation incorporated are summarized in Table 3.7-2 and 3.7-3. As shown in the

tables, the annual GHG emissions associated with buildout of the proposed Project would be 35,046.9406 $MTCO_2e$ with the above referenced mitigation incorporated and 38,140.9406 $MTCO_2e$ without mitigation. The mitigation results in a decrease of 2,952.5844 $MTCO_2e$.

TABLE 3.7-2: OPERATIONAL GHG EMISSIONS 2019 (UNMITIGATED METRIC TONS/YR)

CATEGORY	BIO-CO_2	NBIO-CO_2	TOTAL CO_2	CH_4	N_2O	CO_2E
Area	0.0000	563.3545	563.3545	0.0256	0.0101	566.9879
Energy	0.0000	5,882.0240	5,882.0240	0.2122	0.0736	5,909.2519
Mobile	0.0000	30,476.6123	30,476.6123	2.3808	0.0000	30,536.1327
Waste	310.8685	0.0000	310.8685	18.3718	0.0000	770.1635
Water	31.7372	221.3705	253.1077	3.2697	0.0790	358.4047
Total	**342.6057**	**37,143.3613**	**37,485.9670**	**24.2601**	**0.1627**	**38,140.9406**

SOURCE: CALEEMOD (V.2016.3.1).

TABLE 3.7-3: OPERATIONAL GHG EMISSIONS 2019 (MITIGATED METRIC TONS/YR)

CATEGORY	BIO-CO_2	NBIO-CO_2	TOTAL CO_2	CH_4	N_2O	CO_2E
Area	0.0000	563.3545	563.3545	0.0256	0.0101	566.9879
Energy	0.0000	5,309.3006	5,309.3006	0.1936	0.0657	5,333.7139
Mobile	0.0000	28,021.8889	28,021.8889	2.3109	0.0000	28,079.6615
Waste	310.8685	0.0000	310.8685	18.3718	0.0000	770.1635
Water	25.3898	185.9785	211.3682	2.6162	0.0633	295.6407
Total	**336.2582**	**34,080.5226**	**34,416.7808**	**23.5181**	**0.1391**	**35,046.1673**

SOURCE: CALEEMOD (V.2016.3.1).

Estimated GHG emissions associated with the buildout of the proposed Project in 2020 with and without the above mitigation incorporated are summarized in Table 3.7-4 and 3.7-5. As shown in the table, the annual 2020 GHG emissions associated with buildout of the proposed Project would be 34,569.7106 $MTCO_2e$ with the above referenced mitigation incorporated and 37,610.1251 $MTCO_2e$ without mitigation. The mitigation results in a decrease of 3,882.3594 $MTCO_2e$.

TABLE 3.7-4: OPERATIONAL GHG EMISSIONS 2020 (UNMITIGATED METRIC TONS/YR)

CATEGORY	BIO-CO_2	NBIO-CO_2	TOTAL CO_2	CH_4	N_2O	CO_2E
Area	0.0000	563.3545	563.3545	0.0255	0.0101	566.9854
Energy	0.0000	5,882.0240	5,882.0240	0.2122	0.0736	5,909.2519
Mobile	0.0000	29,948.9491	29,948.9491	2.2548	0.0000	30,005.3196
Waste	310.8685	0.0000	310.8685	18.3718	0.0000	770.1635
Water	31.7372	221.3705	253.1077	3.2697	0.0790	358.4047
Total	**342.6057**	**36,615.6981**	**36,958.3038**	**24.1340**	**0.1627**	**37,610.1251**

SOURCE: CALEEMOD (V.2016.3.1).

TABLE 3.7-5: OPERATIONAL GHG EMISSIONS 2020 (MITIGATED METRIC TONS/YR)

CATEGORY	BIO-CO_2	NBIO-CO_2	TOTAL CO_2	CH_4	N_2O	CO_2E
Area	0.0000	563.3545	563.3545	0.0255	0.0101	566.9854
Energy	0.0000	5,309.3006	5,309.3006	0.1936	0.0657	5,333.7139
Mobile	0.0000	24,548.4244	24,548.4244	2.1913	0.0000	27,603.2072
Waste	310.8685	0.0000	310.8685	18.3718	0.0000	770.1365
Water	25.3898	185.9785	211.3682	2.6162	0.0633	295.6407
Total	**336.2582**	**33,607.0580**	**33,943.3136**	**23.3984**	**0.1391**	**34,569.7106**

SOURCE: CALEEMOD (V.2016.3.1).

The following is a comparison of the GHG emission reduction from projected BAU levels (i.e., 2005 scenario) by the year 2020. The proposed Project's BAU levels were evaluated in order to determine the net decrease in the proposed Project's GHG emissions over time. Table 3.7-6 presents the projected BAU GHG emissions, which are estimated to be 41,027.4686 $MTCO_2e$.

TABLE 3.7-6: OPERATIONAL GHG EMISSIONS BUSINESS AS USUAL (UNMITIGATED METRIC TONS/YR)

CATEGORY	BIO-CO_2	NBIO-CO_2	TOTAL CO_2	CH_4	N_2O	CO_2E
Area	0.0000	563.3545	563.3545	0.0351	0.0101	567.2258
Energy	0.0000	5,882.024	5,882.024	0.2122	0.0736	5,909.2519
Mobile	0.0000	33,231.1926	33,231.1926	7.6492	0.0000	33,422.4227
Waste	310.8685	0.0000	310.8685	18.3718	0.0000	770.1635
Water	31.7372	221.3705	253.1077	3.2697	0.0790	358.4047
Total	**342.6057**	**39,897.9416**	**40,240.5473**	**29.5380**	**0.1627**	**41,027.4686**

SOURCE: CALEEMOD (V.2016.3.1).

Consequently, the proposed Project would result in approximately a 15.7 percent reduction in annual GHG emissions from the BAU level by 2020 ([41,027.4686 $MTCO_2e$ – 34,569.7106 $MTCO_2e$] / 41,027.4686 $MTCO_2e$ x 100% = 15.74%). The reduction in GHG emissions would be attributable to the traffic, energy, water, and solid waste mitigation model inputs as well as the advancement of vehicle and equipment efficiency, and more stringent standards and regulations as time progresses, such as State regulation emission reductions (e.g., Pavley, Low Carbon Fuel Standard, and Renewable Portfolio Standard). It should be noted that although a reduction related to such attributes would occur for every development project, CalEEMod takes into consideration how much of each attribute is applied for each specific project based on the size of the project and associated land uses.

The 15.7 percent GHG emission reduction is based on the incorporations of mitigation measures, which are Best Performance Standards (BPS). The BPSs incorporated into the proposed Project include the following:

<u>Traffic Mitigation</u>

- Increase Density (4.9 dwelling units per acre)
- Improve Walkability Design (minimum 152 intersections per square mile)

- Improve Destination Accessibility (minimum distance to downtown is 2.9 miles)
- Increase Transit Accessibility in the Project area (minimum distance to transit stops is 0.9 miles)
- Improve Pedestrian Network so that the Project area connects to offsite pedestrian networks
- Provide traffic calming measures on at least 25% of street segments and intersections

Energy Mitigation

- Exceed Title 24 by 15%
- Install High Efficiency Lighting
- Install High Efficiency Appliances within buildings

Area Mitigation

- Use Low VOC Cleaning Supplies
- Use Only Natural Gas Hearths

Water Mitigation

- Apply a Water Conservation Strategy to achieve a 20% reduction in indoor and outdoor water usage
- Install low flow bathroom faucet
- Install low-flow kitchen faucet
- Install low-flow toilet
- Install low-flow shower
- Use water-efficient irrigation systems

In addition, as stated previously, the proposed Project would be required to comply with the minimum mandatory measures of the CalGreen Code. Furthermore, reduction of cumulative ROG and NO_x emissions due to the Indirect Source Rule mitigation (discussed in Section 3.3 Air Quality) would subsequently result in an associated reduction in CO_2 emissions. The total reduction in GHG emissions from BAU levels will be 15.7 percent at a minimum.

Regional Transportation Plan/Sustainably Communities Strategy: SJCOG released the Final Draft of the RTP/SCS on June 13, 2014. The RTP/SCS reflects a region-specific, balanced multimodal plan that only achieves the intent and promise of SB 375 and can be implemented through existing and planned programs or policies. The RTP/SCS foundation comprises recent household and job growth forecasts, market demand and economic studies, and transportation studies including SJCOG's Smart Growth Transit Oriented Development Plan, Goods Movement Study, and Regional Bike/Pedestrian/Safe Routes to School Master Plan.

Chapter 3 of the RTP/SCS contains policies and supportive strategies in order to address the transportation needs of the San Joaquin region and quantify regional needs in the 2014-2040 planning horizon. One of the strategies in Table 3.1 of the SJCOG RTP/SCS aims to optimize public transportation to provide efficient and convenient access for users at all income levels. Another

strategy aims to provide transportation improvements to facilitate non-motorized travel. San Joaquin Regional Transit District (RTD) Route 91 currently runs from downtown Stockton to the Manteca Transit Center along S. Main Street. Route 91 then travels along State Route 99 towards Ripon. The Manteca Transit Center is located approximately 2.9 miles northeast of the Project site. Manteca Transit provides a Route 2 and Route 3 bus stop near the intersection of Brook View Land and Daniels Street, located approximately 0.9 miles northeast of the Project site. Therefore, the proposed Project would be located in an area that is currently served by the San Joaquin RTD. Additionally, as require by Mitigation Measure 3.3-2, the Project would incorporate bus turnouts and transit improvements where requested by the San Joaquin RTD, continuous public sidewalks and/or multi-use trails adjacent to all proposed public streets, and paving and striping for bike lanes/paths. Furthermore, as required by Mitigation Measure 3.3-3, the Project is required to prepare and implement a transportation demand management (TDM) plan for the non-residential portion of the Project. The TDM plan is required to be coordinated with SCJOG's Commute Connection Program.

In addition to policies and supportive strategies to address the transportation needs of the region, the RTP/SCS contains a map and associated table of the land uses, locations, and densities of new growth assumed until 2035 in Appendix M, Performance Measures, of the RTP/SCS. The Project site is assumed for low density residential development, high density residential development, and commercial development in Appendix M.

As demonstrated above, the proposed Project would be generally consistent with the goals and strategies of the RTP/SCS.

Manteca Climate Action Plan: The City of Manteca Climate Action Plan (2013) sets forth a feasible strategy to reduce community-generated GHG emissions, consistent with statewide GHG reduction efforts for consideration and potential adoption by the City Council.

The Climate Action Plan contains strategies by emissions sector (i.e., land use and transportation, transportation facilities and demand strategies, energy conservation, waste diversion and recycling and energy recovery, strategies for existing development, and municipal strategies). Only some of the reduction measures would apply to the proposed Project. For example, Strategy ENB-1 requires all new development to exceed Title 24 standards by at least 10 percent. The proposed Project will comply with Title 24, Part 6 of the California Code of Regulations, known as the Building Energy Efficiency Standards. This includes the CALGreen requirements for new buildings to reduce water consumption by 20 percent, and install low pollutant-emitting materials. Additionally, Strategies BI-1 through BI-3 encourage the development of bicycle infrastructure. As noted above, the Project would incorporate continuous public sidewalks and/or multi-use trails adjacent to all proposed public streets, paving and striping for bike lanes/paths, and bus turnouts and transit improvements where requested by the San Joaquin RTD. Furthermore, Strategy MUD-1 encourages mixed-use development in new growth areas. The proposed Project includes residential uses at various densities, and includes a commercial area in the northern portion of the site.

As demonstrated above, the proposed Project would be generally consistent with the goals and strategies of the Manteca Climate Action Plan.

Conclusion: As stated previously, short-term construction GHG emissions are a one-time release of GHGs and are not expected to significantly contribute to global climate change over the lifetime of the proposed Project. With the implementation of the mitigation measures included within this section and Section 3.2 (Air Quality), the overall annual GHG emissions associated with the proposed Project would be reduced by 15.7 percent by the year 2020. The mitigation measures include mobile source, area source, energy, and water measures.

Additionally, the Project would be generally consistent with the goals, policies, and measures of the RTP/SCS and the Manteca Climate Action Plan. The Project is currently served by the San Joaquin RTD and would incorporate bus turnouts and transit improvements where requested by the San Joaquin RTD, continuous public sidewalks and/or multi-use trails adjacent to all proposed public streets, and paving and striping for bike lanes/paths. The Project site is assumed for low density residential development, high density residential development, and commercial development in Appendix M of the RTP/SCS. The Project would also comply with Strategies ENB-1, BI-1 through BI-3, and MUD-1 of the Climate Action Plan by complying with the CALGreen requirements and providing transit amenities on-site.

The proposed Project demonstrates that it has included feasible BPSs that will collectively reduce GHG emissions by 15.7 percent. Nevertheless, the proposed Project will result in a net increase in emissions that will contribute to global climate change. While the 15.7 percent reduction is a reflection of the proposed Project's intent to comply with the SJVAPCD's efforts to ensure that land development projects reduce GHG by incorporated BPSs, there will be an overall net increase in GHG emissions. As such, impacts related to GHG emissions and global climate change would be considered **significant and unavoidable** even with the implementation of mitigation measures.

MITIGATION MEASURE(S)

Mitigation Measure 3.7-1*: To reduce Greenhouse Gas Emissions and Energy Consumption, the Project applicant shall institute measures to reduce wasteful, inefficient, and unnecessary consumption of energy during construction, operation, and maintenance/landscaping. As the individual phases are designed and undergo Design/Site Plan Review by the City of Manteca, there should be an explanation as to why certain measures were incorporated in the individual phases and why other measures were dismissed. The measures to reduce wasteful, inefficient, and unnecessary consumption of energy during construction, operation, and maintenance/landscaping include the following:*

- *Increase transit accessibility in the Project area by ensuring a minimum distance of 0.9 miles to transit stops.*
- *Ensure that the pedestrian network within the Project area connects to offsite pedestrian networks.*
- *Provide traffic calming measures on all street segments and intersections.*
- *Exceed Title 24 by 15 percent.*

- *Install high efficiency lighting and appliance within all buildings.*
- *Install low-flow faucets, toilets, and showers as applicable.*
- *Use water-efficient irrigation systems throughout the Project area.*

Impact 3.7-2: Cumulative impact on climate change from increased Project-related greenhouse gas emissions. (Cumulatively Considerable and Significant and Unavoidable)

Greenhouse gas emissions from a single project will not cause global climate change; however, greenhouse gas emission from multiple projects throughout a region or state could result in a cumulative impact with respect to global climate change.

In California, there has been extensive legislation passed with the goal of reducing greenhouse gas emissions. The legislative goals are as follows: 1) 2000 levels by 2010, 2) 1990 levels by 2020 and 3) 80 percent below the 1990 levels by the year 2050. To achieve these goals, the CARB has developed regional greenhouse gas emission reduction targets for the automobile and light truck sectors (the largest single source of greenhouse gas emissions) for 2020 and 2035. The regional greenhouse gas emission reduction targets for each region in California were established by the California Air Resources Board.

As described in Impact 3.7-1 above, implementation of the proposed Project will still generate GHG emissions that wouldn't otherwise exist without the proposed Project. Given the length of construction activities for a Project of this size, the construction emissions would be a long-term release of approximately 6,686 MTCO2e. The operational emissions would be a long-term release totaling approximately 29,851 MTCO2e. The City of Manteca must weigh the economic and social benefits of development against the environmental impacts associated with development. The City of Manteca's planning efforts included targeted growth that accommodates the economic and social needs of the community, while recognizing and seeking to mitigate environmental impacts when growth occurs. The proposed Project has incorporated mitigation measures that are intended to reduce emissions to the extent feasible. The State continues to implement measures that are intended to reduce emissions on a State-wide scale (i.e., vehicle fuel efficiency standards in fleets, low carbon fuels, etc.) that are consistent with AB 32. These types of State-wide measures will benefit the proposed Project (and City as a whole) in the long-term as they come into effect; however, the City does not have the jurisdiction to create far reaching (i.e. State-wide) measures to reduce GHG emissions.

Additionally, as demonstrated above, the proposed Project would be generally consistent with the goals and strategies of the RTP/SCS and the Manteca Climate Action Plan. Mitigation Measure 3.7-1 requires measures to reduce wasteful, inefficient, and unnecessary consumption of energy during the operational phase of the proposed Project, including exceedance of Title 24 by 15 percent. This measure would ensure compliance with Strategy ENG-1 of the Manteca Climate Action Plan. Additionally, the proposed Project would be located in an area that is currently served by the San Joaquin RTD. As required by Mitigation Measure 3.3-2, the Project would incorporate bus turnouts and transit improvements where requested by the San Joaquin RTD, continuous public sidewalks and/or multi-use trails adjacent to all proposed public streets, and paving and

striping for bike lanes/paths. Furthermore, as required by Mitigation Measure 3.3-3, the Project is required to prepare and implement a TDM plan for the non-residential portion of the Project. The TDM plan is required to be coordinated with SCJOG's Commute Connection Program. Implementation of Mitigation Measures 3.3-2 and 3.3-3 in Section 3.3 would ensure compliance with Strategies POD-1, POD-2, and TDM-2 of the Manteca Climate Action Plan.

On a project-by-project case, the City of Manteca evaluates a project and the potential to impose project-specific mitigation, which has been done through this GHG analysis. However, because the Project would result in a net increase in CO_2e emissions even with mitigation measures incorporated into the Project, it would result in a **significant and unavoidable** and **cumulatively considerable** impact.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.7-1**.*

Impact 3.7-3: Project implementation may result in the inefficient, wasteful, or unnecessary use of energy resources. (Less than Significant)

Appendix F of the State CEQA Guidelines requires consideration of the potentially significant energy implications of a project. CEQA requires mitigation measures to reduce "wasteful, inefficient and unnecessary" energy usage (Public Resources Code Section 21100, subdivision [b][3]). According to Appendix F of the CEQA Guidelines, the means to achieve the goal of conserving energy include decreasing overall energy consumption, decreasing reliance on natural gas and oil, and increasing reliance on renewable energy sources. In particular, the proposed Project would be considered "wasteful, inefficient, and unnecessary" if it were to violate state and federal energy standards and/or result in significant adverse impacts related to Project energy requirements, energy inefficiencies, energy intensiveness of materials, cause significant impacts on local and regional energy supplies or generate requirements for additional capacity, fail to comply with existing energy standards, otherwise result in significant adverse impacts on energy resources, or conflict or create an inconsistency with applicable plan, policy, or regulation.

The proposed Project is primarily a residential development, with 290 units of high density and 975 units of low density residential housing, and with approximately 237,838 square feet of additional commercial uses, and the proposed uses would not have a high or wasteful demand for energy. The amount of energy used at the residential uses within the Project site would directly correlate to the number and size of residential units, the energy consumption of associated unit appliances, garage usage, and outdoor lighting, landscape maintenance, and other energy uses associated with Project site activities. The commercial uses of the site would correlate with the types and density of commercial uses, and the energy consumption of landscape maintenance activities. There could also be energy usage associated with the park and/or open space uses of the proposed Project, as well as the utility infrastructure that would be provided to serve the proposed Project as a whole. Other proposed Project energy uses include fuel used by vehicle trips generated by the Project during its construction and operation, and fuel used by off-road construction vehicles during construction.

The following discussion provides calculated levels of energy use expected for the proposed Project, based on commonly used modelling software (i.e. CalEEMod v.2016.3.1 and the California Air Resource Board's EMFAC2014). It should be noted that many of the assumptions provided by CalEEMod are conservative relative to the proposed Project. Therefore, this discussion provides a conservative estimate of proposed Project emissions.

Electricity and Natural Gas: Electricity and natural gas used by the proposed Project would be used primarily for residential housing and commercial end uses. Additionally, the energy required to pump water and wastewater to and within the Project site is included under electricity usage. Total annual unmitigated and mitigated electricity (kWh) and natural gas (kBTU) usage associated with the operation of the proposed Project are shown in Tables 3.7-7 and 3.7-8, below (as provided by CalEEMod). The proposed Project incorporates feasible mitigation to reduce the proposed Project's operational electricity and natural gas consumption (see Mitigation Measure 3.7-1).

TABLE 3.7-7: PROJECT OPERATIONAL NATURAL GAS AND ELECTRICITY USAGE (UNMITIGATED SCENARIO)

EMISSIONS[A]	*NATURAL GAS (KBTU/YEAR)*	*ELECTRICITY (KWH/YEAR)*
Apartments Low Rise	4,717,760	1,401,120
Regional Shopping Center	2,794,600	2,887,350
Single Family Housing	31,188,200	8,831,730
Total	**38,700,560**	**13,120,020**

NOTE: [A] NUMBERS PROVIDED HERE MAY NOT ADD UP EXACTLY TO TOTAL DUE TO ROUNDING.

SOURCE: CALEEMOD (V.2016.3.1).

TABLE 3.7-8: PROJECT OPERATIONAL NATURAL GAS AND ELECTRICITY USAGE (MITIGATED SCENARIO)

EMISSIONS[A]	*NATURAL GAS (KBTU/YEAR)*	*ELECTRICITY (KWH/YEAR)*
Apartments Low Rise	4,126,980	1,305,650
Regional Shopping Center	2,388,250	2,510,430
Single Family Housing	26,902,900	8,304,380
Total	**33,418,130**	**12,120,460**

NOTE: [A] NUMBERS PROVIDED HERE MAY NOT ADD UP EXACTLY TO TOTAL DUE TO ROUNDING.

SOURCE: CALEEMOD (V.2016.3.1).

According to CalEEMod's Appendix A: Calculation Details for CalEEMod, CalEEMod uses the California Commercial End Use Survey (CEUS) database to develop energy intensity value for non-residential buildings. The energy use from residential land uses is calculated based on the Residential Appliance Saturation Survey (RASS). Similar to CEUS, this is a comprehensive energy use assessment that includes the end use for various climate zones in California.

As shown in Tables 3.7-7 and 3.7-8, Project operational energy usage would be reduced with implementation of Mitigation Measure 3.7-1, as described previously within this section. As described under Impact 3.7-1, under Mitigation Measure 3.7-1, the proposed Project incorporates feasible mitigation that would reduce the proposed Project's energy consumption, as compared to the unmitigated scenario. Measures included within Mitigation Measure 3.7-1 that would increase Project energy efficiency include increasing Project building energy efficiency to 15% better than

Title 24, installing high efficiency lighting and appliances, and using water-efficient irrigation systems throughout the Project area. The Project's energy requirements would be reduced by 13.6 percent (natural gas) and 7.6 percent (electricity) with the incorporation of mitigation.

On-road Vehicles (Operation): The proposed Project would generate vehicle trips during its operational phase. According to the traffic data provided for the proposed Project by Fehr & Peers, the Project would generate approximately 21,366 gross weekday daily vehicle trips. Weekday trips represent a conservative estimate of average daily trips generated by the Project, since fewer trips would be expected to be generated by the Project on weekend days (i.e., Saturday and Sunday). In order to calculate operational on-road vehicle energy usage and emissions, default trip lengths generated by CalEEMod were used, which are based on the Project location and urbanization level parameters selected within CalEEMod (i.e., "San Joaquin Valley" Air District and "Urban" urbanization level). These values are provided by the individual districts or use a default average for the state, depending on the location of the proposed Project (ENVIRON, 2013). Based on default factors provided by CalEEMod, the weighted average distance per trip is assumed to be approximately 9.0 miles. Therefore, the proposed Project would generate at total of approximately 191,585 average daily vehicle miles travelled (Average Daily VMT). Using fleet mix data provide by CalEEMod (v.2016.3.1), and Year 2019 gasoline and diesel MPG (miles per gallon) factors for individual vehicle classes as provided by EMFAC2014, weighted MPG factors of approximately 24.4 for gasoline and 6.7 for diesel were derived. With this information, the unmitigated proposed Project would generate vehicle trips that would use a total of approximately 6,586 gallons of gasoline and 5,527 gallons of diesel fuel per day, on average, or 2,403,810 gallons of gasoline and 2,017,333 annual gallons of diesel fuel per year.

On-road Vehicles (Construction): The proposed Project would also generate on-road vehicle trips during Project construction (from construction workers and vendors). Estimates of vehicle fuel consumed were derived based on the assumed construction schedule, vehicle trip lengths and number of workers per construction phase as provided by CalEEMod, and Year 2019 gasoline MPG factors provided by EMFAC2014. For the purposes of simplicity, it was assumed that all on-road worker vehicles generated by the construction phase of the Project would use gasoline as a fuel source (as opposed to diesel fuel or alternative sources). Additionally, it was assumed that all on-road vendor trucks generated by the construction phase would use diesel fuel. Table 3.7-9, below, describes gasoline and diesel fuel used by on-road mobile sources during each phase of the construction schedule.

As shown in the table, the vast majority of on-road mobile vehicle fuel used during the construction of the proposed Project would occur during the building construction phase. See Appendix B for detailed calculations of on-road mobile fuel generated during the Project construction period.

TABLE 3.7-9: ON-ROAD MOBILE FUEL GENERATED BY PROJECT CONSTRUCTION ACTIVITIES – BY PHASE

CONSTRUCTION PHASE	# OF DAYS	TOTAL DAILY WORKER TRIPS[A]	TOTAL DAILY VENDOR TRIPS[A]	GALLONS OF GASOLINE FUEL[B]	GALLONS OF DIESEL FUEL[B]
Demolition	1	8	-	3.6	-
Site Preparation	26	18	-	209.7	-
Grading	100	30	-	1,343.9	-
Paving	86	15	-	577.9	-
Building Construction	920	636	174	262,122.6	169,033.7
Architectural Coating	920	127	-	52,342.1	-
Total		**707**	**174**	**316,600**	**169,034**

NOTES: [A] PROVIDED BY CALEEMOD. [B]SEE APPENDIX B FOR FURTHER DETAIL.

SOURCE: CALEEMOD (V.2016.3.1); EMFAC2014.

Off-road Vehicles (Construction): Off-road construction vehicles would use diesel fuel during the construction phase of the proposed Project. A non-exhaustive list of off-road constructive vehicles that could be used during the construction phase of the proposed Project includes: cranes, forklifts, generator sets, tractors, excavators, and dozers. Based on the total amount of CO_2 emissions expected to be generated by the off-road mobile vehicles during the construction phase of the proposed Project (as provided by the CalEEMod output), and a CO_2 to diesel fuel conversion factor (provided by the U.S. Energy Information Administration), the proposed Project would use a total of approximately 188,752 gallons of diesel fuel for off-road construction vehicles. Detailed calculations are provided in Appendix B.

Other: Proposed Project landscape maintenance activities would generally require the use fossil fuel (i.e., gasoline) energy. For example, lawn mowers require the use of fuel for power. As an approximation, it is estimated that gasoline-powered landscape care maintenance would occur 0.25 hours per week for each residential unit proposed. Given a total of 1,265 dwelling units, landscape maintenance would occur for 16,445 hours per year. With a conservative estimate of approximately 0.5 gallons of gasoline used per person-hour of landscape maintenance, the proposed Project would require the use of approximately 8,223 gallons of gasoline per year to power landscape maintenance equipment for residential uses. The use of landscape maintenance equipment for the commercial and open space uses of the proposed Project would be relatively small in comparison to use of such equipment within the residential areas of the Project site, given the relatively small amount of the land area that would be dedicated to these uses. It is assumed that fuel usage for landscape maintenance equipment for both commercial and open space areas of the Project site would not exceed a total of approximately 6,000 gallons of gasoline per year. Therefore, total energy needed to for Project landscape activities would be expected to be no greater than approximately 14,223 gallons per year. The energy used to power landscape maintenance equipment would not differ substantially from the energy required for landscape maintenance for similar types of projects.

The proposed Project could also use other sources of energy not identified here. Examples of other energy sources include alternative and/or renewable energy (such as solar PV) and/or on-site

stationary sources (such as on-site diesel generators) for electricity generation. However, these sources of energy are not currently planned to be utilized for the proposed Project.

Conclusion: The proposed Project would use energy resources for the operation of Project buildings (i.e., electricity and natural gas), for on-road vehicle trips (i.e., gasoline and diesel fuel) generated by the proposed Project, and from off-road vehicles generated by and associated with the proposed Project (i.e., diesel fuel). Each of these activities would require the use of energy resources. The proposed Project would be responsible for conserving energy, to the extent feasible, and relies heavily on reducing per capita energy consumption to achieve this goal, including through Statewide and local measures.

The proposed Project would be in compliance with all applicable Federal, State, and local regulations regulating energy usage. For example, PG&E is responsible for the mix of energy resources used to provide electricity for its customers, and it is in the process of implementing the Statewide Renewable Portfolio Standard (RPS) to increase the proportion of renewable energy (e.g., solar and wind) within its energy portfolio. Based on this requirement, PG&E is expected to procure at least 33% of its electricity resources from renewable energy resources by 2020, and 50% by 2030. Other Statewide measures, including those intended to improve the energy efficiency of the statewide passenger and heavy-duty truck vehicle fleet (e.g., the Pavley Bill and the Low Carbon Fuel Standard), would improve vehicle fuel economies, thereby conserving gasoline and diesel fuel. These energy savings would continue to accrue over time. Furthermore, as described previously, the incorporation of the mitigation measure described previously in this section would further reduce Project energy. The proposed Project would also be in compliance with the planning documents described previously within this section.

As a result, the proposed Project would not result in any significant adverse impacts related to Project energy requirements, energy use inefficiencies, and/or the energy intensiveness of materials by amount and fuel type for each stage of the Project including construction, operations, maintenance, and/or removal. PG&E, the electricity and natural gas provider to the site, maintains sufficient capacity to serve the proposed Project. The proposed Project would comply with all existing energy standards, including those established by the City of Manteca, and would not result in significant adverse impacts on energy resources. Although improvements to City's pedestrian, bicycle, and public transit systems would provide further opportunities for alternative transit, the proposed Project would be linked closely with existing networks that, in large part, are sufficient for most residents of the proposed Project and the City of Manteca as a whole. For these reasons, and others (as described previously), the proposed Project would not be expected cause an inefficient, wasteful, or unnecessary use of energy resources nor cause a significant impact on any of the threshold as described by Appendix F of the CEQA Guidelines. This is a **less than significant** impact.

The purpose of this section is to disclose and analyze the potential impacts associated with hazards and hazardous materials related to the Project site and general vicinity, and to analyze the potential for exposure of people to hazards and hazardous materials as the Project is built and operated in the future. This section is based in part on the *City of Manteca General Plan 2023* (City of Manteca, as amended through 2016) and the *Manteca General Plan 2023 Draft Environmental Impact Report* (City of Manteca, 2003). One comment was received from the San Joaquin County Environmental Health Department during the NOP scoping process related to this environmental topic. Full comments received are included in Appendix A.

3.8.1 ENVIRONMENTAL SETTING

PHYSICAL SETTING

Project Location

The Project site is located in the southwestern portion of the City of Manteca city limits. The Project site is immediately southeast of the intersection of Bronzan Road and McKinley Avenue. The Project site is south of State Route (SR) 120, approximately 2.8 miles southeast of downtown Manteca. Figures 2.0-1 and 2.0-2 found in Section 2.0 illustrate the regional location and Project vicinity.

Existing Site Uses

The Project site has some existing improvements including an existing barn area with associated equipment, dirt and paved roadways, and irrigation ditches. The majority of the Project site is in active agricultural use. The barn structure is located in the central portion of the Project site. Additionally, Woodward Avenue traverses the center of the Project site from east to west, and McKinley Avenue traverses the northern portion of the Project site from north to south.

Existing Surrounding Uses

Uses immediately adjacent to the east, south, and west of the Project site include agricultural and residential uses, including ranchettes and large estates lots. Other existing uses east of the northerly portion of the Project site include a single family residential subdivision west of South Airport Way. Existing and future residential subdivisions also exist to the west of the Project site. Other nearby uses include rural residential uses north of the Project site and south of SR 120.

Site Topography

The Project site is relatively flat and ranges in elevation from approximately 20 to 30 feet above sea level as shown in Figure 2.0-4.

Site Soils

The NRCS Web Soil Survey indicates the presence of two soil series occurring within the Project site. Table 3.8-1 identifies the soils found on the Project site.

TABLE 3.8-1: NRCS SOIL SERIES INFORMATION

SERIES	*DESCRIPTION*	*SOURCE MATERIAL*	*DRAINAGE*	*PERCENT OF AOI*
Entisol	Arents, saline-sodic	Alluvial fans from mixed rock sources	Somewhat poorly drained	31.4
Delhi	Delhi loamy sand, MLRA 17	Wind modified material weathered from granitic rock sources	Somewhat excessively drained	6.8
Dello	Dello loamy sand, drained	Alluvium derived from granitic rock sources	Very poorly drained	34.8
Grangeville	Grangeville fine sandy loam, partially drained	Moderate coarse textured alluvium dominantly from granitic rock sources	Somewhat excessively drained	0.0
Tinnin	Tinnin loamy coarse sand	Alluvium derived from granitic rock sources	Well drained	27.0

SOURCE: NRCS WEB SOIL SURVEY 2016.

HAZARDS ASSESSMENT

For the purposes of this EIR, "hazardous material" is defined as provided in California Health & Safety Code, Section 25501:

- Any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment.

"Hazardous materials" include, but are not limited to, hazardous substances, hazardous waste, and any material that a handler or the administering agency has a reasonable basis for believing that it would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment.

"Hazardous waste" is a subset of hazardous materials. For the purposes of this EIR, the definition of hazardous waste is essentially the same as that in the California Health & Safety Code, Section 25517, and in the California Code of Regulations (CCR), Title 22, Section 66261.2:

- Hazardous wastes are wastes that, because of their quantity, concentration, physical, chemical, or infectious characteristics, may either cause, or significantly contribute to, an increase in mortality or an increase in serious illness, or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

CCR Title 22 categorizes hazardous waste into hazard classes according to specific characteristics of ignitibility, corrosivity, reactivity, or toxicity. Hazardous waste with any of these characteristics is also known as a Resource Conservation and Recovery Act (RCRA) waste.

Hazardous materials can be categorized as hazardous non-radioactive chemical materials, radioactive materials, toxic materials, and biohazardous materials. The previous definitions are adequate for non-radioactive hazardous chemicals. Radioactive and biohazardous materials are further defined as follows:

- Radioactive materials contain atoms with unstable nuclei that spontaneously emit ionizing radiation to increase their stability.
- Radioactive wastes are radioactive materials that are discarded (including wastes in storage) or abandoned.
- Toxic wastes are harmful or fatal when ingested or absorbed (e.g., containing mercury, lead). When toxic wastes are land disposed, contaminated liquid may leach from the waste and pollute groundwater.
- Biohazardous materials include materials containing certain infectious agents (microorganisms, bacteria, molds, parasites, and viruses) that cause or significantly contribute to increased human mortality or organisms capable of being communicated by invading and multiplying in body tissues.
- Medical wastes include both biohazardous wastes (byproducts of biohazardous materials) and sharps (devices capable of cutting or piercing, such as hypodermic needles, razor blades, and broken glass) resulting from the diagnosis, treatment, or immunization of human beings, or research pertaining to these activities.

There are countless categories of hazardous materials and hazardous wastes that could be found on any given property based on past uses. Some common examples include agrichemicals (chlorinated herbicides, organophosphate pesticides, and organochlorine pesticides, such as such as Mecoprop (MCPP), Dinoseb, chlordane, dichloro-diphenyltrichloroethane (DDT), and dichloro-diphenyl-dichloroethylene (DDE)), petroleum based products (oil, gasoline, diesel fuel), a variety of chemicals including paints, cleaners, and solvents, and asbestos-containing or lead-containing materials (e.g., paint, sealants, pipe solder).

Adjoining Properties

The Project site is immediately southeast of the intersection of Bronzan Road and McKinley Avenue. The Project site is bounded on the north by an existing dirt roadway between Bronzan Road and Atherton Drive, on the east by South McKinley Avenue and an existing residential subdivision, on the south by existing agricultural fields, and on the west by existing agricultural fields and the future Atherton Drive right-of-way.

Site Reconnaissance

Site reconnaissance was conducted in July 2016. The Project site was observed to be currently used for agricultural uses. There was no obvious indication of spillage or staining observed. There are no known underground storage tanks within the Project site.

Historical Use Information

Historical information was reviewed to develop a history of the previous uses on the Project site and surrounding area, in order to evaluate the Project site and adjoining properties for evidence of Recognized Environmental Conditions. Standard historical sources reviewed during the preparation of this report included the following, as available: Aerial Photographs, Environmental Records, and Databases.

AERIAL PHOTOGRAPHS

Aerial photographs of the Project site and general vicinity were reviewed. In 1993, the Project site contained the existing barn in the central portion of the site and the remainder of the site contained agricultural fields. During this time, the areas to the east and west of the site did not contain the residential uses that exist currently. Agricultural operations appear to have occurred throughout the majority of the Project site during this time. Additionally, the existing rural residential uses north of the Project site along Bronzan Road are shown on the 1993 aerial photographs. By 2006, the residential subdivision to the east of the site had begun development. From 2007 to present, the entire Project site has remained in agricultural use.

ENVIRONMENTAL RECORDS

A search of local, state, and federal agency databases for the Project site and known contaminated sites in the vicinity was performed. None of the parcels in the Project site were found to contain any known contamination.

The U.S. Environmental Protection Agency (EPA) Toxic Release Inventory (TRI) does not list data on disposal or other releases of toxic chemicals in the Project site (USEPA, 2015). There are no TRI sites in the City of Manteca. The nearest TRI site is located at 1700 E. Louise Avenue in Lathrop, approximately 3.65 miles northwest of the Project site.

The California Department of Toxic Substances Control (DTSC) maintains the *Envirostor Data Management System*, which provides information on hazardous waste facilities (both permitted and corrective action) as well as any available site cleanup information. There is one site listed in the Envirostor database within the Project site. This site, the Tara Park Elementary School Alternative Location, is located at 19589 South McKinley Avenue. The site was a school investigation project and has a status of "No Further Action". The second nearest site listed on the Envirostor database is located at 2401 East Woodward Avenue, approximately 0.15 miles west of the Project site. The site was a school investigation project and has a status of "No Further Action".

GeoTracker is the State Water Resources Control Board's (SWRCB's) Internet-accessible database system used by the SWRCB, regional boards, and local agencies to track and archive compliance data from authorized or unauthorized discharges of waste to land, or unauthorized releases of hazardous substances from underground storage tanks (USTs). See Table 3.8-2 for the site identified by the GeoTracker database as being located within 1.0 mile of the Project site.

TABLE 3.8-2: GEOTRACKER HAZARDOUS MATERIAL RELEASE SITE WITHIN 1.0 MILE OF PROJECT SITE

SITE NAME	*TYPE*	*CLEANUP STATUS*	*ADDRESS*
PG&E Transformer Release	Cleanup Program Site	Completed – Case Closed	2978 W. Yosemite Ave.

SOURCE: SWRCB, GEOTRACKER, 2016.

The Solid Waste Information System (SWIS) is a database of solid waste facilities that is maintained by the California Integrated Waste Management Board (CIWMB). The SWIS data identifies active, planned and closed sites. The Project site does not have any active or planned solid waste facilities

listed in the database. The nearest active facility, Haley Farms Compost Operation, is located approximately 5.7 miles west of the Project site.

None of the records reviewed for the Project site indicate that a Recognized Environmental Condition is associated with the Project site.

DATABASES

There is a broad list of federal and state databases that provide information for sites with varying potential for risk from the possible existence of hazardous materials. There are numerous redundancies among these various database listings. Below is a brief summary of each.

National Priorities List: The National Priorities List (NPL) of Superfund Sites and Proposed NPL Sites is EPA's database of more than 1,200 sites designated or proposed for priority cleanup under the Superfund program. NPL sites may encompass relatively large areas. The Project site is not listed in this database.

RCRIS System: The Resource Conservation and Recovery Information System (RCRIS) is an EPA database that includes selective information on sites that generate, transport, store, treat, and/or dispose of hazardous waste as defined by RCRA. Identification on this list does not indicate that there has been an impact on the environment. The Project site is not listed in this database.

CERCLIS Data: Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) is an EPA database that contains information on potential hazardous waste sites that have been reported to the EPA by states, municipalities, private companies, and individuals, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites that are either proposed for or on the NPL, as well as sites that are in the screening and assessment phase for possible inclusion on the NPL. The Project site is not listed in this database.

CORRACTS: Corrective Action Report (CORRACTS) is an EPA database that identifies hazardous waste handlers with RCRA corrective action activity. The Project site is not listed in this database.

Cortese Database: The Cortese database identifies public drinking water wells with detectable levels of contamination, hazardous substance sites selected for remedial action, sites with known toxic material identified through the abandoned site assessment program, sites with USTs having a reportable release, and all solid waste disposal facilities from which there is known hazardous substance migration. The source of this database is the California Environmental Protection Agency (Cal-EPA) and are found in the GeoTracker database. The Project site is not listed in this database.

GeoTracker has replaced past databases, such as the Leaking Underground Storage Tank Information System (LUSTIS) and the Underground Storage Tank (UST) database. Permitted USTs are not located in the Project site. The nearest permitted UST is located at Super Store Industries (16888 McKinley Ave., Lathrop), located approximately 1.6 miles north of the Project site.

Hazardous Material Sites

As noted above, the State of California Hazardous Waste and Substances Site List (also known as the "Cortese List") is a planning document used by the state, local agencies, and developers to comply with the California Environmental Quality Act (CEQA) requirements for providing information about the location of hazardous materials sites. Government Code Section 65962.5 requires the Cal EPA to annually update the Cortese List. The DTSC is responsible for preparing a portion of the information that comprises the Cortese List. Other state and local government agencies are required to provide additional hazardous material release information that is part of the complete list.

GeoTracker is a geographic information system (GIS) that provides online access to environmental data and is the interface to the Geographic Environmental Information Management System (GEIMS), a data warehouse which tracks regulatory data about underground fuel tanks, fuel pipelines, and public drinking water supplies. Searches of the above resources and records identified three hazardous material sites within 0.5 miles of the Project site known to handle and store hazardous materials that are associated with a hazardous material related release or occurrence. The terms "release" or "occurrence" include any means by which a substance could harm the environment: by spilling, leaking, discharging, dumping, injecting, or escaping. Table 3.8-2 displays the hazardous material site within 1.0 mile of the Project site with a description of the hazards provided. Additionally, Table 3.8-3 displays the known hazardous material sites within 2.0 mile of the Project site with a description of the hazards provided. As noted previously, none of the parcels in the Project site were found to contain any known contamination. Two open cases, Frank's One Stop verification monitoring site and Ted Peters Trucking Manteca Facility remediation site, are located approximately 1.25 miles and 1.35 miles north of the Project site, respectively.

TABLE 3.8-3: GEOTRACKER HAZARDOUS MATERIAL RELEASE SITES WITHIN 2.0 MILE OF PROJECT SITE

SITE NAME	*TYPE*	*CLEANUP STATUS*	*ADDRESS*
ABF Freight	LUST Cleanup Site	Completed – Case Closed	2427 Yosemite Ave.
D'Arcy Parkway Road Extension	Cleanup Program Site	Open – Inactive	400-500 D'Arcy Pkwy.
Frank's One Stop	LUST Cleanup Site	Open – Verification Monitoring	2072 W. Yosemite Ave.
J.R. Simplot Company	Cleanup Program Site	Open – Site Assessment	16777 Howland Rd.
MBP Mossdale	LUST Cleanup Site	Completed – Case Closed	444 Mossdale St.
PG&E Transformer Release	Cleanup Program Site	Completed – Case Closed	2978 W. Yosemite Ave.
Ted Peters Trucking	LUST Cleanup Site	Completed – Case Closed	1985 Yosemite Ave.
Ted Peters Trucking Manteca Facility	Cleanup Program Site	Open – Remediation	1985 Yosemite Ave.

NOTE: LUST = LEAKING UNDERGROUND STORAGE TANK.

SOURCE: SWRCB, GEOTRACKER, 2016.

In addition to sites listed above, the Project site and the surrounding areas do not contain identified oil and gas monitoring wells.

Transportation of Hazardous Materials

The transportation of hazardous materials within the City of Manteca Planning Area is subject to various federal, state, and local regulations. The following provisions are included in the California Vehicle Code (CVC) and pertain to the transportation of hazardous related materials.

- The Highway Patrol designates the routes in California which are to be used for the transportation of explosives. (Section 31616)
- The CVC applies when the explosives are transported as a delivery service for hire or in quantities in excess of 1,000 pounds. The transportation of explosives in quantities of 1,000 pounds or less, or other than on a public highway, is subject to the California Health and Safety Code. (Section 31601(a))
- It is illegal to transport explosives or inhalation hazards on any public highway not designated for that purpose, unless the use of the highway is required to permit delivery of, or the loading of, such materials. (Section 31602(b) and Section 32104(a))
- When transporting explosives through or into a city for which a route has not been designated by the Highway Patrol, drivers must follow routes as may be prescribed or established by local authorities. (Section 31614(a))
- Inhalation hazards and poison gases are subject to additional safeguards. These materials are highly toxic, spread rapidly, and require rapid and widespread evacuation if there is loss of containment or a fire. The Highway Patrol designates through routes to be used for the transportation of inhalation hazards. It may also designate separate through routes for the transportation of inhalation hazards composed of any chemical rocket propellant. (Section 32100 and Section 32102(b))

In addition to area roadways, hazardous materials are routinely transported on Union Pacific Railroad lines that are roughly one-half mile northwest of the Project boundary. Hazardous materials are transported on these lines. The risk of accidents, and more specifically accidents involving hazardous materials, is relatively low. The U.S. Department of Transportation Federal Railroad Administration found the UPRR company train accident rate to be 4.18 train accidents per one million train miles traveled, resulting in a less than 0.001% chance of an accident. Risk of a railroad accident containing hazardous materials is considered much lower, as only an average of eight accidents involving hazardous material spills occur annually in California.

The Union Pacific Railroad Company does implement a security plan in compliance with the Department of Transportation Final Rule 49 CFR Part 172 Hazardous Materials (HM 232): Security Requirements for Offerors and Transporters of Hazardous Materials. The plan includes requirements to enhance the security of transported hazardous materials and ensures proper cleanup procedures in the instance of an accidental release.

FIRE HAZARDS

Wild fires are a major hazard in the State of California. Wild fires burn natural vegetation on developed and undeveloped lands and include timber, brush, woodland, and grass fires. While low intensity wild fires have a role in the County's ecosystem, wild fires put human health and safety,

structures (e.g., homes, schools, businesses, etc.), air quality, recreation areas, water quality, wildlife habitat and ecosystem health, and forest resources at risk.

Wildland fire hazards exist in varying degrees in the foothill portion of the County located to the east and southwest of the Project site. The Project site is located in the valley floor, which is predominantly under agricultural or urban use. This area has a low fire hazard risk.

3.8.2 REGULATORY SETTING

FEDERAL

The primary federal agencies that are responsible for overseeing regulations and policies regarding hazardous materials are the Environmental Protection Agency (EPA), Department of Labor Occupational Safety and Health Administration (OSHA), and the Department of Transportation (DOT). Several laws governing the transport, storage, and use of hazardous materials are governed by these agencies as well as oversight for contaminated sites cleanup. Federal laws and regulations that are applicable to hazards and hazardous materials are presented below.

Resource Conservation and Recovery Act

The 1976 Federal Resource Conservation and Recovery Act (RCRA) and the 1984 RCRA Amendments regulate the treatment, storage, and disposal of hazardous and non-hazardous wastes. The legislation mandated that hazardous wastes be tracked from the point of generation to their ultimate fate in the environment. This includes detailed tracking of hazardous materials during transport and permitting of hazardous material handling facilities.

The 1984 RCRA amendments provided the framework for a regulatory program designed to prevent releases from USTs. The program establishes tank and leak detection standards, including spill and overflow protection devices for new tanks. The tanks must also meet performance standards to ensure that the stored material will not corrode the tanks. Owners and operators of USTs had until December 1998 to meet the new tank standards. As of 2001, an estimated 85 percent of USTs were in compliance with the required standards.

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (the Act) introduced active federal involvement to emergency response, site remediation, and spill prevention, most notably the Superfund program. The Act was intended to be comprehensive in encompassing both the prevention of, and response to, uncontrolled hazardous substances releases. The Act deals with environmental response, providing mechanisms for reacting to emergencies and to chronic hazardous material releases. In addition to establishing procedures to prevent and remedy problems, it establishes a system for compensating appropriate individuals and assigning appropriate liability. It is designed to plan for and respond to failure in other regulatory programs and to remedy problems resulting from action taken before the era of comprehensive regulatory protection.

Natural Gas Pipeline Safety Act

The Natural Gas Pipeline Safety Act authorizes the U.S. Department of Transportation Office of Pipeline Safety to regulate pipeline transportation of natural (flammable, toxic, or corrosive) gas and other gases as well as the transportation and storage of liquefied natural gas. The Office of Pipeline Safety regulates the design, construction, inspection, testing, operation, and maintenance of pipeline facilities. While the federal government is primarily responsible for developing, issuing, and enforcing pipeline safety regulations, the pipeline safety statutes provide for State assumption of the intrastate regulatory, inspection, and enforcement responsibilities under an annual certification. To qualify for certification, a state must adopt the minimum federal regulations and may adopt additional or more stringent regulations as long as they are not incompatible.

STATE

The primary state agencies that are responsible for overseeing regulations and policies regarding hazardous materials are the California Office of Emergency Services (OES), California Environmental Protection Agency (Cal-EPA), Department of Toxic Substances Control (DTSC), California Department of Transportation (Caltrans), California Highway Patrol (CHP), California Water Quality Control Board, and the California Air Resources Board. Several laws governing the generation, transport, and disposal of hazardous materials are administered by these agencies. State laws and regulations that are applicable to hazards and hazardous materials are presented below.

California Health and Safety Code

Cal-EPA has established rules governing the use of hazardous materials and the management of hazardous wastes. Many of these regulations are embodied in the California Health and Safety Code. The code includes regulations that govern safe drinking water, substances control, land reuse and revitalization, remediation, restoration, and methamphetamine contaminated cleanups.

California Code of Regulations Title 22 and Title 26

The California Code of Regulations (CCR) Title 22 provides state regulations for hazardous materials, and CCR Title 26 provides regulation of hazardous materials management. In 1996, Cal/EPA established the "Unified Hazardous Waste and Hazardous Materials Management Regulatory Program" (Unified Program) which consolidated the six administrative components of hazardous waste and materials into one program.

LOCAL

City of Manteca General Plan

POLICIES: HAZARDOUS MATERIALS SAFETY

- S-P-15. The City shall maintain an awareness of hazardous materials throughout the Manteca region.

- S-P-16. City approvals of all new development shall consider the potential for the production, use, storage, and transport of hazardous materials and provide for reasonable controls on such hazardous materials.
- S-P-17. Within its authority, the City shall regulate the production, use, storage, and transport of hazardous materials to protect the health of Manteca residents.

IMPLEMENTATION: HAZARDOUS MATERIALS SAFETY

- S-I-9. The City shall require businesses that manufacture, store, use, or transport significant quantities of hazardous materials to identify annually such materials and their quantities.
- S-I-10. The City shall require the submittal of lists of hazardous materials used in existing and proposed industrial and commercial businesses within the City of Manteca. The list shall be maintained through the Manteca Fire Department and updated through periodic review.
- S-I-11. The City shall work with San Joaquin County and other public agencies to inform consumers about household use and disposal of hazardous materials.
- S-I-12. Cooperate fully with Union Pacific Railroad and other agencies, such as the CHP, in the event of a hazardous material emergency.
- S-I-13. Continue the City hazardous waste pick-up program for household hazardous materials.

POLICIES: EMERGENCY PROCEDURES

- S-P-19. The City shall maintain and periodically update the City's Emergency Plan.

IMPLEMENTATION POLICIES: EMERGENCY PROCEDURES

- S-I-15. The City shall conduct periodic emergency response exercises to test the effectiveness of City emergency response procedures.
- S-I-16. The City shall review County and State emergency response procedures that must be coordinated with City procedures.

Certified Unified Program Agency (CUPA)

The California Environmental Protection Agency designates specific local agencies as Certified Unified Program Agencies (CUPA), typically at the county level. The San Joaquin County Department of Environmental Health is the CUPA designated for San Joaquin County. The San Joaquin County Department of Environmental Health is responsible for the implementation of statewide programs within its jurisdiction, including: Underground storage of hazardous substances (USTs), Hazardous Materials Business Plan (HMP) requirements, California Accidental Release Prevention (Cal-ARP) program, etc. Implementation of these programs involves permitting, inspecting, providing education/guidance, investigations, and enforcement.

3.8.3 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the proposed Project will have a significant impact from hazards and hazardous materials if it will:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.
- Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment.
- For a Project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project result in a safety hazard for people residing or working in the Project area.
- For a Project within the vicinity of a private airstrip, would the Project result in a safety hazard for people residing or working in the Project area.
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.
- Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildands are adjacent to urbanized areas or where residences are intermixed with wildlands.

IMPACTS AND MITIGATION MEASURES

Impact 3.8-1: Potential to create a significant hazard through the routine transport, use, or disposal of hazardous materials or through the reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. (Less than Significant with Mitigation)

Construction Phase Impacts: Construction activities would occur in phases through the development of the proposed Project. Construction equipment and materials would likely require the use of petroleum based products (oil, gasoline, diesel fuel), and a variety of chemicals including paints, cleaners, and solvents. The use of these materials at a construction site will pose a reasonable risk of release into the environment if not properly handled, stored, and transported. A release into the environment could pose significant impacts to the health and welfare of people and/or wildlife, and could result in contamination of water (groundwater or surface water), habitat, and countless important resources.

Like most agricultural and farming operations in the Central Valley, agricultural practices in the area have used agricultural chemicals including pesticides and herbicides as a standard practice. Although no contaminated soils have been identified on the Project site or the vicinity above applicable levels, residual concentrations of pesticides may be present in soil as a result of historic agricultural application and storage. Continuous spraying of crops over many years can potentially result in a residual buildup of pesticides, in farm soils. Of highest concern relative to agrichemicals are chlorinated herbicides, organophosphate pesticides, and organochlorine pesticides, such as such as Mecoprop (MCPP), Dinoseb, chlordane, dichloro-diphenyltrichloroethane (DDT), and dichloro-diphenyl-dichloroethylene (DDE). There are no records of soil contamination on the Project site.

The only structure located on the property include an existing barn structure in the central portion of the Project site. The barn and associated structures will require removal prior to any construction. When the barn is demolished, it will require evaluation for asbestos and lead containing materials. If such materials are present in the demolition of the structures, special demolition and disposal practices are required in accordance with state regulations to ensure their safe handling. Additionally, due to the previous uses of the site, existing water wells may be located on the Project site.

Mitigation measures presented below also require a Soils Management Plan (SMP) to be submitted and approved by the San Joaquin County Department of Environmental Health prior to the issuance of a grading permit. The SMP will establish management practices for handling hazardous materials, including fuels, paints, cleaners, solvents, etc., during construction. Additionally, should any on-site water wells be located on-site, Mitigation Measure 3.8-4 requires proper well abandonment measures to be completed under permit and inspection by the San Joaquin County Environmental Health Department. Implementation of the following mitigation measures will ensure that these potential impacts are reduced to a **less than significant** level.

MITIGATION MEASURE(S)

Mitigation Measure 3.8-1*: A Soils Management Plan (SMP) shall be submitted and approved by the San Joaquin County Department of Environmental Health prior to the issuance of a grading permit. The SMP shall establish management practices for handling hazardous materials, including fuels, paints, cleaners, solvents, etc., during construction. The approved SMP shall be posted and maintained onsite during construction activities and all construction personnel shall acknowledge that they have reviewed and understand the plan.*

Mitigation Measure 3.8-2: *The applicant shall hire a qualified consultant to perform additional testing prior to the issuance of grading permits or demolition permits for construction activities in the following areas that have been deemed to have potential hazardous conditions present:*

- *The remnant construction and/or farming materials (i.e. remnant pipes, etc.).*
- *The soils in the area where farming equipment and above ground tanks have been used.*

The intent of the additional testing is to investigate whether any of the buildings, facilities, or soils contain hazardous materials. If asbestos-containing materials and/or lead are found in the buildings, a Cal-OSHA certified ACBM and lead based paint contractor shall be retained to remove the asbestos-containing materials and lead in accordance with EPA and California Occupational Safety and Health Administration (Cal/OSHA) standards. In addition, all activities (construction or demolition) in the vicinity of these materials shall comply with Cal/OSHA asbestos and lead worker construction standards. The ACBM and lead shall be disposed of properly at an appropriate offsite disposal facility. If surface staining is found on the Project site, a hazardous waste specialist shall be engaged to further assess the stained area.

Mitigation Measure 3.8-3*: Prior to bringing hazardous materials onsite, the applicant shall submit a Hazardous Materials Business Plan (HMBP) to San Joaquin County Environmental Health Division (CUPA) for review and approval. If during the construction process the applicant or his subcontractors generates hazardous waste, the applicant must register with the CUPA as a generator of hazardous waste, obtain an EPA ID# and accumulate, ship and dispose of the hazardous waste per Health and Safety Code Ch. 6.5. (California Hazardous Waste Control Law).*

Mitigation Measure 3.8-4*: Prior to any ground disturbance activities within 50 feet of a well on the Project site, the applicant shall hire a licensed well contractor to obtain a well destruction permit for any wells to be abandoned from the San Joaquin County Environmental Health Department, and properly abandon the on-site well(s), pursuant to review and approval by the City Engineer and the San Joaquin County Environmental Health Department.*

Operational Phase Impacts: The operational phase of the Project will occur after construction is completed and business operators/employees, and residents move in to occupy the structures and facilities on a day-to-day basis.

The proposed Project includes commercial facilities and residential structures. Each of these uses will likely use a variety of hazardous materials commonly found in urban areas including: paints, cleaners, and cleaning solvents. If handled appropriately, these materials do not pose a significant risk. These facilities will store and use these materials. There will be a risk of release of these materials into the environment if they are not stored and handled in accordance with best management practices approved by San Joaquin County Environmental Health Division and the Manteca Fire Department. Implementation of the following mitigation measure will ensure that the proposed Project would have a **less than significant** impact relative to this issue.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.8-3**.*

Impact 3.8-2: Potential to emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school. (Less than Significant)

The proposed Project would include development of up to 237,838 square feet of general commercial uses on approximately 13.0 acres in the northernmost portion of the Project site. A

tentative subdivision map for the general commercial portion of the Project has not been completed. The general commercial site provides an opportunity to locate retail and services scaled to serve the proposed Project and surrounding neighborhoods to enhance the overall walkability within the Project site and to further minimize reliance on vehicles.

In addition, there is a 17-acre planned school site adjacent to the east of the Project site. Other schools near the Project site include: Sierra High School (1.30 miles northeast), Brock Elliot Elementary School (1.45 miles northeast), and Veritas School (2.05 miles east). There are a variety of other schools located beyond three miles from the Project site.

The proposed Project is not anticipated to have businesses that would emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste. However, given the unknown nature of future business establishments within the General Commercial area, the potential for hazardous materials is present. The Safety Element of the City of Manteca General Plan (Subsection 7.3) provides the following policies to abate the possible exposure of schools to hazardous materials: S-P-15 states that the City shall maintain an awareness of hazardous materials throughout the Manteca region; S-P-16 states that City approvals of all new development shall consider the potential for the production, use, storage, and transport of hazardous materials and provide for reasonable controls on such hazardous materials; S-P-17 states that within its authority, the City shall regulate the production, use, storage, and transport of hazardous materials to protect the health of Manteca residents. Additionally, the Safety Element identifies the following Implementation Measures: S-I-9 requires businesses that manufacture, store, use, or transport significant quantities of hazardous materials to identify annually such materials and their quantities; S-I-10 requires the submittal of lists of hazardous materials used in existing and proposed industrial and commercial businesses within the City of Manteca. The list shall be maintained through the Manteca Fire Department and updated through periodic review.

Through compliance with the General Plan Policies and Implementation measures listed above, implementation of the proposed Project would have a **less than significant** impact with regards to this environmental issue.

Impact 3.8-3: Potential to result in impacts from being included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. (Less than Significant)

The hazards assessment included a site reconnaissance, interviews, historical land use research, and database research. The assessment revealed no evidence of historical or existing Recognized Environmental Conditions in connection with the Project site. The project site is not on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. Implementation of the proposed Project would have a **less than significant** impact with regards to this environmental issue.

Impact 3.8-4: Potential for the Project to result in a safety hazards for people residing or working on the Project site as a result of public airport or public use airport. (Less than Significant)

There are no documented public airports or public use airports within close proximity to the Project site. Implementation of the proposed Project would have a **less than significant** impact with regards to this environmental issue.

Impact 3.8-5: Potential for the Project to result in safety hazards for people residing or working on the Project site as a result of a private airstrip. (Less than Significant)

There are no documented private airstrips within close proximity to the Project site. Implementation of the proposed Project would have a **less than significant** impact with regards to this environmental issue.

Impact 3.8-6: Potential to impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. (Less than Significant)

The Office of Emergency Services (OES) maintains an Emergency Operations Plan (EOP) that serves as the official Emergency Plan for San Joaquin County. It includes planned operational functions and overall responsibilities of County Departments during an emergency situation. The Emergency Plan also contains a threat summary for San Joaquin County, which addresses the potential for natural, technological and human-caused disasters (County Code, Title 4-3007).

The County OES also prepared a Hazardous Materials Area Plan (§2720 H&S, 2008) that describes the hazardous materials response system developed to protect public health, prevent environmental damage and ensure proper use and disposal of hazardous materials. The plan establishes effective response capabilities to contain and control releases, establishes oversight of long-term cleanup and mitigation of residual releases, and integrates multi-jurisdiction and agency coordination. This plan is now implemented by the San Joaquin County Environmental Health Department.

The San Joaquin County Environmental Health Department maintains a Hazardous Materials Management Plan/ Hazardous Materials Business Plan (HMMP/HMBP). The HMMP/HMBP describes agency roles, strategies and processes for responding to emergencies involving hazardous materials. The Environmental Health Department maintains a Hazardous Materials Database and Risk and Flood Maps available to the public on its website.

In San Joaquin County, all major roads are available for evacuation, depending on the location and type of emergency that arises. The proposed Project does not include any actions that would impair or physically interfere with any of San Joaquin County's emergency plans or evacuation routes. Future uses on the Project site will have access to the County resources that establish protocols for safe use, handling and transport of hazardous materials. Construction activities are not expected to result in any unknown significant road closures, traffic detours, or congestion that

could hinder the emergency vehicle access or evacuation in the event of an emergency. Implementation of the proposed Project would have a **less than significant** impact with regards to this environmental issue.

Impact 3.8-7: Potential to expose people or structures to a risk of loss, injury or death from wildland fires. (Less than Significant)

The risk of wildfire is related to a variety of parameters, including fuel loading (vegetation), fire weather (winds, temperatures, humidity levels and fuel moisture contents) and topography (degree of slope). Steep slopes contribute to fire hazard by intensifying the effects of wind and making fire suppression difficult. Fuels such as grass are highly flammable because they have a high surface area to mass ratio and require less heat to reach the ignition point. The County has areas with an abundance of flashy fuels (i.e. grassland) in the foothill areas of the eastern and western portion of the County. The Project site is located in an area that is predominately agricultural uses, which is not at a significant risk of wildlife. The proposed Project would have a **less than significant** impact with regards to this environmental issue.

This section describes the regulatory setting, regional hydrology and water quality, impacts that are likely to result from project implementation, and measures to reduce potential impacts to water quality. This section is based in part on the following documents, reports and studies: *City of Manteca General Plan 2023* (City of Manteca, as amended through 2016), *Manteca General Plan 2023 Draft Environmental Impact Report* (City of Manteca 2003), *California Water Plan Update 2013* (DWR 2013), *Manteca Storm Drain Master Plan* (City of Manteca 2013), *California's Groundwater Bulletin 118, San Joaquin Valley Groundwater Basin, Eastern San Joaquin Subbasin* (DWR 2006), *California's Groundwater* (DWR 2003), *Eastern San Joaquin Groundwater Basin Groundwater Management Plan* (SJRGA 2013), *Custom Soils Report for San Joaquin County, California* (NRCS 2016), *and Web Soil Survey* (NRCS 2015). Four comments were received during the NOP comment period regarding hydrology and water quality (listed below). Full comments received are included in Appendix A.

Comments relevant to hydrology and water quality include:

1. California Water Boards, Central Valley Regional Water Quality Control Board;
2. City of Lathrop;
3. San Joaquin County Environmental Health Department; and
4. Terra Land Group, LLC.

3.9.1 ENVIRONMENTAL SETTING

REGIONAL HYDROLOGY

San Joaquin County is located in the San Joaquin River watershed. The San Joaquin River is about 300 miles long. It begins in the Sierra Nevada mountain range on California's eastern border. The river runs down the western slope of the Sierra and flows roughly northwest through the Central Valley, to where it meets the Sacramento River at the Sacramento-San Joaquin Delta, a 1,000-square-mile maze of channels and islands that drains more than 40 percent of the state's lands (SJRGA 2013).

Because the Central Valley receives relatively little rainfall (12 to 17 inches a year, falling mostly October through March), snowmelt runoff from the mountains is the main source of fresh water in the San Joaquin River. Over its 300-mile length, the San Joaquin River is fed by many other streams and rivers, most notably the Stanislaus, Tuolumne and Merced rivers.

Most of the surface water in the upper San Joaquin River is stored and diverted at Millerton Lakes' Friant Dam, near Fresno. From Friant Dam, water is pumped north through the Madera Canal and south through the Friant-Kern canal to irrigation districts and other water retailers, which then deliver the water directly to the end users in the southern portion of the watershed.

In the central and northern portions of the watershed, many agricultural and municipal users receive water from irrigation districts, such as the Modesto, Merced, Oakdale, South San Joaquin and Turlock Irrigation Districts. That water is provided through diversions from rivers that are tributary to the San Joaquin, such as the Mokelumne, Stanislaus, Tuolumne and Merced rivers.

In an average year, about 1.5 million acre-feet of water is diverted from the San Joaquin River at Friant Dam, leaving little flow in the river until the Merced River joins the San Joaquin northwest of the City of Merced. Additional water also reaches the river via flows returning to the river from municipal wastewater treatment plants, as well as urban and agricultural runoff. The rest of the area's water supply needs are met by importing water from northern California (via the Central Valley Project) and by pumping water from the groundwater basin (SJRGA 2013).

Climate

Summers in the region are warm and dry ranging from an average high in July of 93°F to an average low of approximately 59°F. Winters are cool and mild, with an average high of 53°F and a low of 37°F in January. The average annual precipitation is approximately 13.81 inches. Precipitation occurs as rain most of which falls between the months of November through April, peaking in January at 2.85 inches. The average temperatures range from December lows of 37.5 F to July highs of 94.3 F.

Watersheds

A watershed is a region that is bound by a divide that drains to a common watercourse or body of water. Watersheds serve an important biological function, oftentimes supporting an abundance of aquatic and terrestrial wildlife including special-status species and anadromous and native local fisheries. Watersheds provide conditions necessary for riparian habitat.

The State of California uses a hierarchical naming and numbering convention to define watershed areas for management purposes. This means that boundaries are defined according to size and topography, with multiple sub-watersheds within larger watersheds. Table 3.9-1 shows the primary watershed classification levels used by the State of California. The second column indicates the approximate size that a watershed area may be within a particular classification level, although variation in size is common.

TABLE 3.9-1. STATE OF CALIFORNIA WATERSHED HIERARCHY NAMING CONVENTION

WATERSHED LEVEL	*APPROXIMATE SQUARE MILES (ACRES)*	*DESCRIPTION*
Hydrologic Region (HR)	12,735 (8,150,000)	Defined by large-scale topographic and geologic considerations. The State of California is divided into ten HRs.
Hydrologic Unit (HU)	672 (430,000)	Defined by surface drainage; may include a major river watershed, groundwater basin, or closed drainage, among others.
Hydrologic Area (HA)	244 (156,000)	Major subdivisions of hydrologic units, such as by major tributaries, groundwater attributes, or stream components.
Hydrologic Sub-Area (HSA)	195 (125,000)	A major segment of an HA with significant geographical characteristics or hydrological homogeneity.

SOURCE: CALIFORNIA DEPARTMENT OF WATER RESOURCES, 2012.

Hydrologic Region

San Joaquin County is located in the San Joaquin River Hydrological Region. The San Joaquin River is the principal river of the region, and all other streams of the region are tributary to it. The Mokelumne River and its tributary the Cosumnes River originate in the central Sierra Nevada, along with the more southerly Stanislaus and Tuolumne rivers. The Merced River flows from the south central Sierra Nevada and enters the San Joaquin near the City of Newman. The Chowchilla and Fresno rivers also originate in the Sierra south of the Merced River and trend westward toward the San Joaquin River. Creeks originating in the Coast Range and draining eastward into the San Joaquin River include Del Puerto Creek, Orestimba Creek, and Panoche Creek. Del Puerto Creek enters the San Joaquin near the City of Patterson, and Orestimba Creek enters north of the City of Newman. During flood years, Panoche Creek may enter the San Joaquin River or the Fresno Slough near the town of Mendota. The Kings River is a stream of the Tulare Lake Hydrologic Region, but in flood years it may contribute to the San Joaquin River, flowing northward through the James Bypass and Fresno Slough to enter near the City of Mendota. The Mud, Salt, Berrenda, and Ash sloughs also add to the San Joaquin River, and numerous lesser streams and creeks also enter the system, originating in both the Sierra Nevada and the Coast Range. The entire San Joaquin river system drains northwesterly through the Delta to Suisun Bay (DWR 2013, pg. SJR-5).

The City of Manteca and much of the surrounding area is located in the Eastern San Joaquin River Subbasin. This groundwater basin covers approximately 1,105 square miles and extends from the Mokelumne River on the north and northwest; San Joaquin River on the west; Stanislaus River on the south; and consolidated bedrock on the east. The Eastern San Joaquin Subbasin is bounded on the south, southwest, and west by the Modesto, Delta-Mendota, and Tracy Subbasins, respectively and on the northwest and north by the Solano, South American, and Cosumnes Subbasins. The Solano and South American are subbasins of the Sacramento Valley Groundwater Basin (DWR 2006, pg. 1).

The majority of the Project site is located in the Oakwood Lake - San Joaquin River watershed. The remainder of the Project site, which will remain as open space as part of the Project, is located in the Walthall Slough-San Joaquin River watershed. See Figure 3.9-1.

Groundwater

The City of Manteca is located in the Eastern San Joaquin River Groundwater Basin. The basin is not adjudicated; however, a basin management plan has been created. The Eastern San Joaquin Groundwater Basin Groundwater Management Plan (ESJGB-GMP) (NSJCGB, 2004) was prepared in September 2004. The purpose of the ESJGB-GMP is "to review, enhance, assess, and coordinate existing groundwater management policies and programs in Eastern San Joaquin County and to develop new policies and programs to ensure the long-term sustainability of groundwater resources in Eastern San Joaquin County." According to Department of Water Resources (DWR) Bulletin 118 (DWR, 2006), the ESJGB is in a critical condition of overdraft.

Most of the fresh groundwater is encountered at depths of less than 1,000 feet, and most of this shallow groundwater is unconfined. A discussion of basin hydrogeology is provided in the ESJGB-GMP. The Victor formation is the uppermost formation and extends from the ground surface to a

maximum depth of about 150 feet. Compared to the underlying formations, the Victor formation is generally more permeable and the groundwater is typically unconfined.

The underlying Laguna formation includes discontinuous lenses of unconsolidated to semi-consolidated sands and silts interspersed with lesser amounts of clay and gravel. The Laguna formation is hydraulically connected to the Victor formation and is estimated to be 750 to 1,000 feet thick. Moderate permeability has been reported within the Laguna formation with some highly permeable coarse-grained beds. Most of the municipal and industrial wells in the region penetrate through the Victor formation into the Laguna formation.

The City's annual potable groundwater production has steadily increased historically, reaching a peak of 14,900 AF in 2004. Since 2006, after the commissioning of the South County Water Supply Program (SCWSP), the total groundwater pumping for the City of Manteca has ranged from 8,062 AFY to 10,374 AFY, averaging about 8,700 AFY. According to the City's 2015 UWMP, the sustainable yield of the groundwater basin is estimated to be approximately 1 acre-foot per acre per year. Although groundwater pumping in some years has exceeded that rate, as part of the SSJID's SCWSP, the City intends to limit groundwater pumping to that rate or less. The City's 2015 UWMP assumes that the annexation of new developments will add at least 184 AFY of groundwater safe yield by 2030.

LOCAL SETTING

The Project site is relatively flat with natural gentle slope from north to south. The Project site topography ranges in elevation from approximately 20 to 30 feet above sea level. There are no natural water courses in the Project site. The Project site has some existing improvements including an existing barn area with associated equipment, dirt and paved roadways, and irrigation ditches. The majority of the Project site is in active agricultural use. The barn structure is located in the central portion of the Project site. Additionally, Woodward Avenue traverses the center of the Project site from east to west, and McKinley Avenue traverses the northern portion of the Project site from north to south.

The Project site is in the Oakwood Lake - San Joaquin River watershed, which is part of the San Joaquin River watershed.

Groundwater

The local groundwater basin and City groundwater use are described in the City's 2005 UWMP. A brief description of the groundwater basin and a discussion of historical and projected groundwater pumping are provided below.

BASIN BOUNDARIES, SOILS, AND STORAGE CAPACITY

The City's wells are located in the Eastern San Joaquin County Groundwater Basin. The basin is not adjudicated; however, a basin management plan has been created. The Eastern San Joaquin Groundwater Basin Groundwater Management Plan (ESJGB-GMP) (NSJCGB, 2004) was prepared in September 2004. The purpose of the ESJGB-GMP is "to review, enhance, assess, and coordinate

existing groundwater management policies and programs in Eastern San Joaquin County and to develop new policies and programs to ensure the long-term sustainability of groundwater resources in Eastern San Joaquin County." According to Department of Water Resources (DWR) Bulletin 118 (DWR, 2006), the ESJGB is in a critical condition of overdraft. Groundwater levels have declined in the basin since the 1960s with the lowest groundwater levels found in eastern San Joaquin County.

Most of the fresh groundwater is encountered at depths of less than 1,000 feet, and most of this shallow groundwater is unconfined. A discussion of basin hydrogeology is provided in the ESJGB-GMP. The Victor formation is the uppermost formation and extends from the ground surface to a maximum depth of about 150 feet. Compared to the underlying formations, the Victor formation is generally more permeable and the groundwater is typically unconfined.

The underlying Laguna formation includes discontinuous lenses of unconsolidated to semi-consolidated sands and silts interspersed with lesser amounts of clay and gravel. The Laguna formation is hydraulically connected to the Victor formation and is estimated to be 750 to 1,000 feet thick. Moderate permeability has been reported within the Laguna formation with some highly permeable coarse-grained beds. Most of the municipal and industrial wells in the Manteca area penetrate through the Victor formation into the Laguna formation.

PAST AND PROJECTED FUTURE GROUNDWATER PUMPING

The City's annual potable groundwater production has steadily increased historically, reaching a peak of 14,900 AF in 2004. Commissioning of the surface water treatment plant in 2005 decreased groundwater use considerably and currently supplies an average of 52 percent of the City's annual potable water supply. Since 2005, the City has constructed dedicated irrigation wells at many parks in an effort to reduce potable demand, which requires wellhead treatment at many wells for arsenic and other constituents to meet drinking water standards. In 2000, the City pumped about 1.2 AFY/acre, but this has since decreased to about 0.7 AFY/acre in 2010 and to about 0.5 AFY/acre in 2015.

When the City annexes new areas, there is a corresponding increase in total groundwater safe yield. However, the 1 AFY/acre does not provide sufficient water supply for most projects. The City's 2015 UWMP assumes that the annexation of new developments will add at least 184 AFY of groundwater safe yield by 2030.

Drainage

The City of Manteca provides and maintains a system of storm drains, detention basins, and pumping facilities as well as monitoring and control of the operations of the storm drain system. Additionally, the City enforces storm drain regulations established by the US EPA and the State of California.

The City maintains a dynamic computer model of its storm drainage system. The model was formulated as an XP-SWMM model originally developed by the US EPA. The current version was advanced by a private sector organization, XP Software, Inc. The model provides analysis over time

and offers the ability to maximize the efficiency of detention basin and pump operations along with the ability to monitor and control downstream water levels to minimize flooding problems with a minimum of new capital improvements.

The South San Joaquin Irrigation District (SSJID) owns a complex network of irrigation Laterals and Drains that run throughout the City limits. These facilities deliver irrigation water to various farming operations in the region, and they convey excess irrigation water and field runoff to downstream receiving waters, specifically the San Joaquin River. The City relies on SSJID's facilities to convey its storm water runoff to the San Joaquin River and will continue to do so through buildout of the City's General Plan.

The City and SSJID have a long-standing agreement that authorizes the City to discharge its storm water runoff into SSJID facilities for ultimate disposal to the San Joaquin River. In 1975 the City first entered into a storm drainage agreement with SSJID, and in 2006 the City renewed its drainage agreement with SSJID. Of the many requirements in the 2006 Agreement, the two most significant new requirements are that all storm water discharges into SSJID facilities must be monitored and controlled such that the capacity of SSJID's facilities is not exceeded, and that storm water quality must be controlled such that it complies with all applicable laws.

The City meets the first requirement by requiring all new development to attenuate its runoff in a storage facility before pumping it into SSJID's facilities. In addition, the City uses real-time water level monitoring stations at critical low points in the conveyance system complete with SCADA (Supervisory Control and Data Acquisition) facilities. Regarding the water quality requirement, the City is classified as a Phase II city by the State Water Resources Control Board. As such, the City, and consequently new development, is required to comply with the State Board's storm water NPDES permit for Phase II cities.

Per the City/SSJID Master Drainage Agreement, SSJID prohibits the direct discharge of storm water runoffs into its facilities. Accordingly, the City requires all new developments to attenuate its runoff in a storage facility before pumping it into SSJID's facilities. For surface attenuation facilities, there are two allowable basin types that may be used for Project site Application: Interim Percolation Basin or a Permanent Detention Basin.

INTERIM PERCOLATION BASIN: RESIDENTIAL AND NON-RESIDENTIAL APPLICATIONS

Percolation basins may be used as an interim measure for retention and disposal of storm water runoff in those areas that will not receive storm drainage service from a major storm drain system by the time development occurs. When discharge capability to a major storm drain system becomes available, the basins are to be exchanged for or converted to detention basins with pumped discharge facilities. Interim percolation basins are to be sized to store two, 10- year, 48-hour duration storm runoff volumes over the entire contributing area.

PERMANENT DETENTION BASIN: RESIDENTIAL APPLICATIONS

Permanent detention basins in Residential areas are to be sized to hold a 10-year, 48-hour duration storm runoff volume resulting from 3.56 inches of rainfall occurring over the entire

contributing area. All basins shall have positive shut-off control. Regional detention basins designed to serve several developments are preferred over smaller, individual basins. Water quality treatment is to be included in detention storage basins to meet stormwater NPDES permit requirements. Detention basins are to be designed as multi-purpose facilities when practical. The volume of detention basins shall be determined with no allowance for percolation or outlet facilities.

LATERALS FOR STORM WATER CONVEYANCE

As previously described, SSJID owns a complex network of irrigation Laterals and Drains that run throughout the City's limits. The hydraulic connectivity of SSJID's system is as follows: 1) irrigation water is conveyed to farming operations via a vast network of Laterals; 2) the Laterals carry excess irrigation water and field runoff to several Drains; 3) the Drains convey water to a large central drain called the French Camp Outlet Canal (FCOC); and 4) the FCOC conveys water to the San Joaquin River.

A fundamental goal of previous storm drain master plans was to minimize the use of SSJID's Laterals for conveyance of storm water runoff to SSJID's Drains. Accordingly, previous master plans specified the construction of a separate storm water conveyance network that by-passed the Laterals and transported storm drainage directly to the Drains. Once the City's storm water reached the Drains, the Drains would continue to provide conveyance to the FCOC and to the San Joaquin River. In the 2013 Storm Drain Master Plan (2013 SDMP), however, the City recognizes the opportunity to minimize infrastructure costs for all parties by abandoning the concept of separate conveyance systems and instead expanding the use of SSJID's Laterals. Laterals that are targeted to convey both storm water and irrigation water to Drains are called dual-use facilities.

This concept is viable since SSJID's Laterals are 1) found virtually everywhere in the existing and undeveloped areas of the City, 2) most of these Laterals are already 42-inch diameter pipe, which is a sufficient size for the City's drainage needs, and 3) SSJID already requires new development projects that disturb their Laterals to remove, realign and replace that infrastructure with an equal or larger diameter pipeline. For situations where the existing Lateral is 36-inch diameter, and SSJID does not require a 42-inch or larger pipe to be installed as a replacement, the City will require a minimum 42-inch diameter pipeline to be installed, and the developer will be reimbursed the upsizing cost for the larger diameter pipe via the Public Facilities Implementation Fee (PFIP) program.

FUTURE STORM WATER DRAINAGE DEMAND AND SYSTEM IMPROVEMENTS

The 2013 SDMP provides a comprehensive planning document to guide improvement and expansion of the City's storm drainage system to meet current and future needs in a safe and reliable manner while maintaining compliance with all applicable regulations. Five planning zones have been identified to define the capital improvements needed to serve future growth: Zones 30, 32, 34, 36 and 39. With the exception of drainage Zone 39, all drainage zones are located in the SSJID service area. The Project site is located in Zone 39, and is not currently served by the SSJID. As a result, the 2013 SDMP identifies a conveyance and disposal system separate from SSJID

facilities for this zone. For development in Zone 39, the 2013 SDMP identifies that separate facilities will be constructed to convey the runoff to one regional pump station that will discharge into Walthall Slough, which terminates into the San Joaquin River to the west. The discharge of stormwater must be treated through BMPs prior to its discharge.

However, as an alternative to the construction of a separate facility in Zone 39 to convey the runoff to a regional pump station that will discharge into Walthall Slough, the City of Manteca and the SSJID are currently working on a plan that will include the SSJID annexation Zone 39 (including the Project site) into the SSJID Service District 4. Under this framework the Project site would convey water to the FCOC; and eventually to the San Joaquin River.

Flooding

Flooding events can result in damage to structures, injury or loss of human and animal life, exposure of waterborne diseases, and damage to infrastructure. In addition, standing floodwater can destroy agricultural crops, undermine infrastructure and structural foundations, and contaminate groundwater.

The Project site lies within the larger area known as the Delta Basin, which historically was a tidal marsh formed in an overflow area of the Sacramento and San Joaquin Rivers. During the early part of the 20th century, over 80 percent of the Delta was reclaimed through construction of levees. There are over 1,100 miles of man-made levees protecting land in the Delta from flooding. The RD-17 levee system is designed to a 100-year protection standard. Figure 3.9-2 shows the flood boundaries as delineated by the Federal Emergency Management Agency (FEMA). As shown in the figure, the majority of the Project site is currently located in Zone X (shaded), 500-year flood zone, which by definition indicates an area protected by levees from the 1% annual chance flood. The southernmost portion of the Project site is located within Zone A, meaning this portion of the site is located within a 100-year flood zone. Figure 3.9-3 shows the flood boundaries as delineated by the U.S. Army Corps of Engineers (USACE). As shown in the figure, the entire Project site is located within the 200-year composite flood plain.

Dam Failure

The Project site is located within dam failure inundation areas. Potential inundation from the New Melones Lake, San Luis Reservoir, Lake McClure Reservoir, Tulloch Reservoir, and Pine Flat Reservoir are shown in Figure 3.9-4. Dam failure is generally a result of structural instability caused by improper design or construction, instability resulting from seismic shaking, or overtopping and erosion of the dam. Larger dams that are higher than 25 feet or with storage capacities over 50 acre-feet of water are regulated by the California Dam Safety Act, which is implemented by the California Department of Water Resources, Division of Safety of Dams (DSD). The DSD is responsible for inspecting and monitoring these dams. The Act also requires that dam owners submit to the California Office of Emergency Services inundation maps for dams that would cause significant loss of life or personal injury as a result of dam failure. The County Office of Emergency Services is responsible for developing and implementing a Dam Failure Plan that designates evacuation plans, the direction of floodwaters, and provides emergency information.

Stormwater Quality

Potential hazards to surface water quality include the following nonpoint pollution problems: high turbidity from sediment resulting from erosion of improperly graded construction projects, concentration of nitrates and dissolved solids from agriculture or surfacing septic tank failures, contaminated street and lawn run-off from urban areas, and warm water drainage discharges into cold water streams.

The most critical period for surface water quality is following a rainstorm which produces significant amounts of drainage runoff into streams at low flow, resulting in poor dilution of contaminates in the low flowing stream. Such conditions are most frequent during the fall at the beginning of the rainy season when stream flows are near their lowest annual levels. Besides the greases, oils, pesticides, litter, and organic matter associated with such runoff, heavy metals such as copper, zinc, and cadmium can cause considerable harm to aquatic organisms when introduced to streams in low flow conditions.

Urban stormwater runoff was managed as a non-point discharge (a source not readily identifiable) under the Federal Water Pollution Control Amendments of 1972 (PL 92-500, Section 208) until the mid-1980's. However, since then, the Federal Environmental Protection Agency has continued to develop implementing rules which categorize urban runoff as a point source (an identifiable source) subject to National Pollution Discharge Elimination System (NPDES) permits. Rules now affect medium and large urban areas, and further rulemaking is expected as programs are developed to meet requirements of Federal water pollution control laws.

Surface water pollution is also caused by erosion. Excessive and improperly managed grading, vegetation removal, quarrying, logging, and agricultural practices all lead to increased erosion of exposed earth and sedimentation of watercourses during rainy periods. In slower moving water bodies these same factors often cause a buildup of siltation, which ultimately reduces the capacity of the water system to percolate and recharge groundwater basins, as well as adversely affecting both aquatic resources and flood control efforts.

303(d) Impaired Water Bodies: Section 303(d) of the federal Clean Water Act requires States to identify waters that do not meet water quality standards or objectives and thus, are considered "impaired." Once listed, Section 303(d) mandates prioritization and development of a Total Maximum Daily Load (TMDL). The TMDL is a tool that establishes the allowable loadings or other quantifiable parameters for a waterbody and thereby the basis for the States to establish water quality-based controls. The purpose of TMDLs is to ensure that beneficial uses are restored and that water quality objectives are achieved.

According to the California Water Quality Control Monitoring Council, which is part of California Environmental Protection Agency, Natural Resources, there are many areas within the San Joaquin County which are considered Section 303(d) impaired waterbodies. Those areas in the regional vicinity of the Project site that are impaired are referred as Delta Waterways (Southern Portion) by the Water Quality Control Monitoring Council. This includes 3,125 acres listed as early as 1996 for Chlorpyrifos (Agriculture, Urban Runoff/Storm Sewers), DDT (Agriculture), Diazinon (Agriculture, Urban Runoff/Storm Sewers), Electrical Conductivity (Agriculture), Group A Pesticides

(Agriculture), Invasive Species (Source Unknown), Mercury (Resource Extraction), and Unknown Toxicity (Source Unknown).

3.9.2 REGULATORY SETTING

There are a number of regulatory agencies whose responsibility includes the oversight of the water resources of the state and nation including the Federal Emergency Management Agency, the US Environmental Protection Agency, the State Water Resources Board, and the Regional Water Quality Control Board. The following is an overview of the federal, state and local regulations that are applicable to the proposed Project.

FEDERAL AND STATE

Clean Water Act (CWA)

The Clean Water Act (CWA), initially passed in 1972, regulates the discharge of pollutants into watersheds throughout the nation. Section 402(p) of the act establishes a framework for regulating municipal and industrial stormwater discharges under the NPDES Program. Section 402(p) requires that stormwater associated with industrial activity that discharges either directly to surface waters or indirectly through municipal separate storm sewers must be regulated by an NPDES permit.

The State Water Resources Control Board (SWRCB) is responsible for implementing the Clean Water Act and does so through issuing NPDES permits to cities and counties through regional water quality control boards. Federal regulations allow two permitting options for stormwater discharges (individual permits and general permits). The SWRCB elected to adopt a statewide general permit (Water Quality Order No. 2013-001-DWQ-DWQ).

Federal Emergency Management Agency (FEMA)

San Joaquin County is a participant in the National Flood Insurance Program (NFIP), a Federal program administered by FEMA. Participants in the NFIP must satisfy certain mandated floodplain management criteria. The National Flood Insurance Act of 1968 has adopted as a desired level of protection, an expectation that developments should be protected from floodwater damage of the Intermediate Regional Flood (IRF). The IRF is defined as a flood that has an average frequency of occurrence on the order of once in 100 years, although such a flood may occur in any given year. Communities are occasionally audited by the Department of Water Resources to insure the proper implementation of FEMA floodplain management regulations.

200-Year Flood Protection in the Central Valley

Both State policy and recently enacted State legislation (Senate Bill 5) call for 200-year (0.5% annual chance) flood protection to be the minimum level of protection for urban and urbanizing areas in the Central Valley. Senate Bill 5 (SB5) requires that the 200-year protection be consistent with criteria used or developed by the Department of Water Resources. SB 5 requires all urban and urbanizing areas in the Sacramento and San Joaquin Valleys to achieve 200-year flood protection in order to approve development. The new law restricts approval of development after 2016 if

"adequate progress" towards achieving this standard is not met. Urban and urbanizing areas protected by State-Federal project levees cannot use "adequate progress" as a condition to approve development after 2025. Adequate progress is defined as meeting all of the following:

1. The project scope, cost and schedule have been developed;
2. In any given year, at least 90% of the revenues scheduled for that year have been appropriated and expended consistent with the schedule;
3. Construction of critical features is progressing as indicated by the actual expenditure of budget funds;
4. The city or county has not been responsible for any significant delay in completion of the system; and
5. The above information has been provided to the DWR and the Central Valley Flood Protection Board and the local flood management agency shall annually report on the efforts to complete the project.

California Water Code

The Federal Clean Water Act places the primary responsibility for the control of surface water pollution and for planning the development and use of water resources with the states, although this does establish certain guidelines for the States to follow in developing their programs and allows the Environmental Protection Agency to withdraw control from states with inadequate implementation mechanisms.

California's primary statute governing water quality and water pollution issues with respect to both surface waters and groundwater is the Porter-Cologne Water Quality Control Act of 1970 (Division 7 of the California Water Code) (Porter-Cologne Act). The Porter-Cologne Act grants the State Water Resource Control Board (SWRCB) and each of the RWQCBs power to protect water quality, and is the primary vehicle for implementation of California's responsibilities under the Federal Clean Water Act. The Porter-Cologne Act grants the SWRCB and the RWQCBs authority and responsibility to adopt plans and policies, to regulate discharges to surface and groundwater, to regulate waste disposal sites and to require cleanup of discharges of hazardous materials and other pollutants. The Porter-Cologne Act also establishes reporting requirements for unintended discharges of any hazardous substance, sewage, or oil or petroleum product.

Each RWQCB must formulate and adopt a water quality control plan (Basin Plan) for its region the regional plans are to conform to the policies set forth in the Porter-Cologne Act and established by the SWRCB in its State water policy. The Porter-Cologne Act also provides that a RWQCB may include within its regional plan water discharge prohibitions applicable to particular conditions, areas, or types of waste.

The Water Code Section 13260 requires all dischargers of waste that may affect water quality in waters of the state to prepare and provide a water quality discharge report to the RWQCB. Section 13260a-c is as follows:

(a) Each of the following persons shall file with the appropriate regional board a report of the discharge, containing the information that may be required by the regional board:

(1) A person discharging waste, or proposing to discharge waste, within any region that could affect the quality of the waters of the state, other than into a community sewer system.

(2) A person who is a citizen, domiciliary, or political agency or entity of this state discharging waste, or proposing to discharge waste, outside the boundaries of the state in a manner that could affect the quality of the waters of the state within any region.

(3) A person operating, or proposing to construct, an injection well.

(b) No report of waste discharge need be filed pursuant to subdivision (a) if the requirement is waived pursuant to Section 13269.

(c) Each person subject to subdivision (a) shall file with the appropriate regional board a report of waste discharge relative to any material change or proposed change in the character, location, or volume of the discharge.

National Pollutant Discharge Elimination System (NPDES)

National Pollutant Discharge Elimination System (NPDES) permits are required for discharges of pollutants to navigable waters of the United States, which includes any discharge to surface waters, including lakes, rivers, streams, bays, the ocean, dry stream beds, wetlands, and storm sewers that are tributary to any surface water body. NPDES permits are issued under the Federal Clean Water Act, Title IV, Permits and Licenses, Section 402 (33 USC 466 et seq.)

The RWQCB issues these permits in lieu of direct issuance by the Environmental Protection Agency, subject to review and approval by the Environmental Protection Agency Regional Administrator. The terms of these NPDES permits implement pertinent provisions of the Federal Clean Water Act and the Act's implementing regulations, including pre-treatment, sludge management, effluent limitations for specific industries, and anti- degradation. In general, the discharge of pollutants is to be eliminated or reduced as much as practicable so as to achieve the Clean Water Act's goal of "fishable and swimmable" navigable (surface) waters. Technically, all NPDES permits issued by the RWQCB are also Waste Discharge Requirements issued under the authority of the CWA.

These NPDES permits regulate discharges from publicly owned treatment works, industrial discharges, stormwater runoff, dewatering operations, and groundwater cleanup discharges. NPDES permits are issued for five years or less, and are therefore to be updated regularly. The rapid and dramatic population and urban growth in the Central Valley Region has caused a significant increase in NPDES permit applications for new waste discharges. To expedite the permit issuance process, the SWRCB has adopted several general NPDES permits, each of which regulates numerous discharges of similar types of wastes. The SWRCB has issued general permits for

stormwater runoff from industrial and construction sites statewide. Stormwater discharges from industrial and construction activities in the Central Valley Region can be covered under these general permits, which are administered jointly by the SWRCB and RWQCB.

Water Quality Control Plan for the Central Valley Region

The Water Quality Control Plan for the Central Valley Region (Basin Plan) includes a summary of beneficial water uses, water quality objectives needed to protect the identified beneficial uses, and implementation measures. The Basin Plan establishes water quality standards for all the ground and surface waters of the region. The term "water quality standards," as used in the Federal Clean Water Act, includes both the beneficial uses of specific water bodies and the levels of quality that must be met and maintained to protect those uses. The Basin Plan includes an implementation plan describing the actions by the RWQCB and others that are necessary to achieve and maintain the water quality standards.

The RWQCB regulates waste discharges to minimize and control their effects on the quality of the region's ground and surface water. Permits are issued under a number of programs and authorities. The terms and conditions of these discharge permits are enforced through a variety of technical, administrative, and legal means. Water quality problems in the region are listed in the Basin Plan, along with the causes, where they are known. For water bodies with quality below the levels necessary to allow all the beneficial uses of the water to be met, plans for improving water quality are included. The Basin Plan reflects, incorporates, and implements applicable portions of a number of national and statewide water quality plans and policies, including the California Water Code and the Clean Water Act.

LOCAL

City of Manteca General Plan

POLICIES: DOMESTIC WATER

- PF-P-4. Secure sufficient sources of water to meet the needs of the existing community and planned residential and commercial growth.
- PF-P-5. City will continue to rely principally on groundwater resources for its municipal water in the near term, will participate in the regional improvements to deliver surface water to augment the City's groundwater supply.
- PF-P-6. The City shall develop new water sources as necessary to serve new development.
- PF-P-7. The City shall develop new water storage facilities and major distribution lines as necessary to serve new development.
- PF-P-8. The City will provide water for future development to maintain a balance of jobs and housing.
- PF-P-9. City water services shall not be extended to unincorporated areas except in extraordinary circumstances. Existing commitments for City water service outside the City limits shall continue to be honored.

- PF-P-10. Development of private water wells within the City limits shall be allowed only where the City makes a finding that it cannot feasibly provide water service. Such systems shall only be allowed to be used until such time as City water service becomes available.
- PF-P-11. The City will develop and implement water conservation measures as necessary elements of the water system.
- PF-P-12. The City shall continue to assess a water development fee on all new commercial, industrial, and residential development sufficient to fund system-wide capacity improvements. The water development fee schedule shall be periodically reviewed and revised as necessary.
- PF-P-13. Ensure that all new development provides for and funds a fair share of the costs for adequate water distribution, including line extensions, easements, and plant expansions.
- PF-P-14. The City shall continuously monitor water flows through the City's water system to identify areas of potential water loss and cases of under billing for water service and shall make improvements in the systems as necessary.
- PF-P-15. The City shall monitor water quality regularly and take necessary measures to prevent contamination.
- PF-P-16. The City of Manteca shall include a groundwater analysis as a technical analysis of water system capacity in the update of the Public Facilities Implementation Plan (PFIP), and shall prepare an environmental analysis in the PFIP that addresses the quality and
- availability of groundwater.
- PF-P-17. The City of Manteca shall consider incremental increases in the demands on groundwater supply and water quality when reviewing development applications.

POLICIES: MAJOR DRAINAGE

- PF-P-26. The City shall continue to complete gaps in the drainage system in areas of existing development.
- PF-P-27. The City shall require the dedication and improvement of drainage detention basins as a condition of development approval according to the standards of the Drainage Master Plan. The responsibility for the dedication and improvement of detention basins shall be based on the prorated share of stormwater runoff resulting from each development.
- PF-P-28. Storm drainage systems within new development areas shall include open drainage corridors where feasible to supplement or replace an underground piped drainage system. The drainage systems would provide for short-term storm water detention, storm water conveyance for storm waters exceeding a 10-year event, storm water quality treatment, bike and pedestrian paths, and visual open space within neighborhoods. The width and length of the corridors would be determined by the stormwater management requirements. The drainage systems would provide a pedestrian connection between parks and access to open space from residential neighborhoods. The neighborhoods would be designed with homes oriented to, rather than backing on the open space corridor.

POLICIES: FLOOD SAFETY

- S-P-7. Periodically review and update when necessary, the General Plan Safety Element goals, policies, and implementation measures in order to maintain compliance with applicable Federal and State requirements.
- S-P-8. Maintain and periodically update, City flood safety plans, floodplain management ordinances, zoning ordinance, building codes and other related sections of the Manteca Municipal Code to reflect Safety Element goals, policies and standards, applicable Federal and State law, and National Flood Insurance Program requirement.
- S-P-9. The City shall require evaluation of potential flood hazards prior to approval of development projects to determine whether the proposed development is reasonably safe from flooding and consistent with California Department of Water Resources (DWR) Urban Level of Flood Protection Criteria. The City shall not approve the execution of a development agreement, a tentative map, or a parcel map for which a tentative map is not required, or a discretionary permit or other discretionary entitlement that would result in the construction of a new building, or construction that would result in an increase in allowed occupancy for an existing building, or issuance of a ministerial permit that would result in the construction of a new residence for property that is located within a 200-year flood hazard zone, unless the adequacy of flood protection as described in Government Code §65865.5(a), 65962(a), or 66474.5(a), has been demonstrated.
- S-P-10. The City may permit new development in areas not identified as "urban" or "urbanizing" provided that they are protected from 100-year flooding by FEMA-accredited levees or equivalent flood protection as shown on an adopted FEMA FIRM, a FEMA-approved Letter of Map Revision (LOMR) or a Conditional Letter of Map Revision (CLOMR), subject to conditions specified in the CLOMR.
- S-P-11. The City may permit new development in areas not protected by FEMA-accredited 100-year levees subject to all applicable requirements of Manteca Municipal Code Chapter 8.30 (Floodplain Management), the California Building Standards Code as adopted by the City, and the latest promulgated FEMA standards for development in the 100-year floodplain, provided that new development approval will not cause the project site or area to be defined as "urban" or "urbanizing."
- S-P-12. Work closely with the City of Lathrop, and the local reclamation districts to improve levee systems as required to provide ULOP for urban and urbanizing areas in Manteca by 2025, and to provide the basis for findings of "adequate progress" toward that objective based on substantial evidence as soon as possible.
- S-P-13. The City shall continue to cooperate with local, regional, State, and Federal agencies in securing funding to obtain the maximum level of flood protection that is practical, with a goal of achieving 200-year flood protection for all areas of the City.
- S-P-14. Maintain active participation in the National Flood Insurance Program (NFIP).
- S-P-15. The City shall maintain eligibility in the Federal Emergency Management Agency's (FEMA's) Community Rating System (CRS) program, which gives property owners discounts on flood insurance.

- S-P-15. The City shall maintain eligibility in the Federal Emergency Management Agency's (FEMA's) Community Rating System (CRS) program, which gives property owners discounts on flood insurance.
- S-P-16. Provide technical assistance and encourage landowners within the FEMA Special Flood Hazard Area (100-year floodplain) to purchase and maintain flood insurance.
- S-P-17. Ensure that the impacts of potential flooding are adequately analyzed when considering areas for future urban expansion.
- S-P-18. Provide opportunities for review of and comment by the reclamation districts, Manteca Police Services, Manteca Fire Department, the Lathrop Manteca Fire District for comment during new development project review.
- S-P-19. Consider the risks of catastrophic dam failure in the planning and environmental review of new development projects.
- S-P-20. Incorporate riparian habitat protection, mitigation or enhancement into flood protection improvements to maintain existing floodwater capacity where feasible.
- S-P-21. Combine flood control, recreation, water quality, and open space functions where feasible.
- S-P-22. Discourage large continuous paved areas unless provided with engineered drainage facilities, and where feasible, require the use of pervious paving materials.
- S-P-23. When improvements to existing developments are made costing at least 50 percent of the current market value of the structure before improvements, structures shall be brought into compliance with relevant FEMA standards.
- S-P-24. The City shall require, for areas protected by levees, all new developments to include a notice within the deed that the property is protected from flooding by a levee and that the property can be subject to flooding if the levee fails or is overwhelmed by floodwater flow.
- S-P-25. The City shall update flood hazard maps as necessary to reflect impacts from climate change in terms of long-term flood safety and long-term flood event probabilities.

POLICIES: WATER CONSERVATION

- RC-P-1. The City shall continue to implement water conservation standards for all commercial and industrial development, and for all existing and new residential development.
- RC-P-2. The City shall explore potential uses of treated wastewater when such opportunities become available.
- RC-P-3. The City shall protect the quantity of Manteca's groundwater.
- RC-P-4. The City shall require water conservation in both City operations and private development to minimize the need for the development of new water sources.
- RC-P-5. Development of private water wells within the city limits shall be allowed only where the City makes a finding that municipal water service is not readily and feasibly available, and such private well systems shall only be allowed to be used until such time as City water service becomes available.

POLICIES: SOILS AND EROSION CONTROL

- RC-P-10. Minimize soil erosion and loss of topsoil from land development activities, wind, and water flow.

POLICIES: WATER QUALITY

- RC-P-11. Minimize sedimentation and loss of topsoil from soil erosion.
- RC-P-12. Minimize pollution of waterways and other surface water bodies from urban runoff.
- RC-P-13. Protect the quality of Manteca's groundwater.
- RC-P-14. Encourage participation by the County and surrounding communities in a basin-wide groundwater management study.
- RC-P-15. Once sewer service has been extended to incorporated areas, new septic tanks shall not be permitted.

City of Manteca Municipal Code

Section 17.30.040, 200-Year Floodplain (F-200) Overlay Zone, of Chapter 17.30 of the Municipal Code delineates the extents of the 200-Year Floodplain and is intended to comprise all known land subject to 200-year flooding within the City. All lands within the F-200 Overlay Zone shall be required to comply with all provisions of subsection C. The purpose of the 200-Year Floodplain (F-200) Overlay Zone is to comply with provisions of State law that require the City to make specific findings prior to approving certain projects located within a 200-year flood hazard area. The F-200 Zone establishes a process for the consideration and regulation of areas subject to 200-year flooding that require special planning to provide for appropriate development. Because the Project site is within the 200-year flood zone, Subsection C of Section 17.30.040 applies to the Project.

Subsection C of Section 17.30.040 states that:

> *The review authority shall not approve the execution of a development agreement, a tentative map, or a parcel map for which a tentative map is not required, or a discretionary permit or other discretionary entitlement that would result in the construction of a new building, or construction that would result in an increase in allowed occupancy for an existing building, or issuance of a ministerial permit that would result in the construction of a new residence for property that is located within the F-200 Zone unless the review authority finds, based on substantial evidence in the record, one of the following:*
>
> 1. *The facilities of the State Plan of Flood Control or other flood management facilities protect the property to the urban level of flood protection in urban and urbanizing areas;*
>
> 2. *The City has imposed conditions on a development agreement, map, permit, or entitlement that will protect the property to the urban level of flood protection in urban and urbanizing areas;*

3. *The local flood management agency has made adequate progress (as defined in California Government Code Section 65007) on the construction of a flood protection system that will result in flood protection equal to or greater than the urban level of flood protection in urban or urbanizing areas; or*

4. *The property is located in an area of potential flooding of three feet or less from a storm event that has a one in two hundred chance of occurring in any given year, from sources other than local drainage, in urban and urbanizing areas.*

3.9.3 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the proposed Project will have a significant impact on the environment associated with hydrology and water quality if it will:

- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of preexisting nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion, siltation, run-off or flooding on- or off-site;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site;
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade water quality;
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows;
- Expose people or structures to significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; or
- Result in inundation by seiche, tsunami or mudflow.

IMPACTS AND MITIGATION

Impact 3.9-1: The proposed Project has the potential to violate water quality standards or waste discharge requirements during construction. (Less than Significant)

According to the United States Environmental Protection Agency, polluted stormwater runoff is a leading cause of impairment to the nearly 40 percent of surveyed U.S. water bodies which do not meet water quality standards. Over land or via storm sewer systems, polluted runoff is discharged, often untreated, directly into local water bodies. Soil erosion is one of the most common sources of polluted stormwater runoff during construction activities. When left uncontrolled, storm water runoff can erode soil and cause sedimentation in waterways, which collectively result in the destruction of fish, wildlife, and aquatic life habitats; a loss in aesthetic value; and threats to public health due to contaminated food, drinking water supplies, and recreational waterways.

Mandated by Congress under the Clean Water Act, the NPDES Stormwater Program is a comprehensive two-phased national program for addressing the non-agricultural sources of stormwater discharges which adversely affect the quality of our nation's waters. The program uses the National Pollutant Discharge Elimination System (NPDES) permitting mechanism to require the implementation of controls designed to prevent harmful pollutants, including soil erosion, from being washed by stormwater runoff into local water bodies. The construction activities for the proposed project would be governed by the General Permit 2009-0009-DWQ (amended by 2010-0014-DWQ & 2012-0006-DWQ), which states:

> *"…Particular attention must be paid to large, mass graded sites where the potential for soil exposure to the erosive effects of rainfall and wind is great and where there is potential for significant sediment discharge from the site to surface waters. Until permanent vegetation is established, soil cover is the most cost-effective and expeditious method to protect soil particles from detachment and transport by rainfall. Temporary soil stabilization can be the single most important factor in reducing erosion at construction sites. The discharger is required to consider measures such as: covering disturbed areas with mulch, temporary seeding, soil stabilizers, binders, fiber rolls or blankets, temporary vegetation, and permanent seeding. These erosion control measures are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed. Erosion control BMPs should be the primary means of preventing storm water contamination, and sediment control techniques should be used to capture any soil that becomes eroded…"*

General Permit 2009-0009-DWQ (amended by 2010-0014-DWQ & 2012-0006-DWQ) further states that:

> *"Sediment control BMPs should be the secondary means of preventing storm water contamination. When erosion control techniques are ineffective, sediment control techniques should be used to capture any soil that becomes eroded. The discharger is required to consider perimeter control measures such as: installing silt fences or placing*

straw wattles below slopes. These sediment control measures are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed…Inappropriate management of run-on and runoff can result in excessive physical impacts to receiving waters from sediment and increased flows. The discharger is required to manage all run-on and runoff from a project site. Examples include: installing berms and other temporary run-on and runoff diversions…All measures must be periodically inspected, maintained and repaired to ensure that receiving water quality is protected. Frequent inspections coupled with thorough documentation and timely repair is necessary to ensure that all measures are functioning as intended…"

Grading, excavation, removal of vegetation cover, and loading activities associated with construction activities could temporarily increase runoff, erosion, and sedimentation. Construction activities also could result in soil compaction and wind erosion effects that could adversely affect soils and reduce the revegetation potential at construction sites and staging areas. To ensure that construction activities are covered under General Permit 2009-0009-DWQ (amended by 2010-0014-DWQ & 2012-0006-DWQ), projects in California must prepare a Stormwater Pollution Prevention Plan (SWPPP) containing Best Management Practices (BMPs) to reduce erosion and sediments to meet water quality standards. Such BMPs may include: temporary erosion control measures such as silt fences, staked straw bales/wattles, silt/sediment basins and traps, check dams, geofabric, sandbag dikes, and temporary revegetation or other ground cover. The BMPs and overall SWPPP is reviewed by the Regional Water Quality Control Board as part of the permitting process. The SWPPP, once approved, is kept on site and implemented during construction activities and must be made available upon request to representatives of the RWQCB and/or the lead agency.

In accordance with the NPDES Stormwater Program, Mitigation Measure 3.6-1 contained in Section 3.6, Geology and Soils, ensures compliance with existing regulatory requirements to prepare a SWPPP designed to control erosion and the loss of topsoil to the extent practicable using BMPs that the RWQCB has deemed effective in controlling erosion, sedimentation, runoff during construction activities. The RWQCB has stated that these erosion control measures are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed. The specific controls are subject to the review and approval by the RWQCB and are an existing regulatory requirement. Implementation of the proposed Project would have a ***less than significant*** impact relative to this topic.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.6-1**.*

Impact 3.9-2: The proposed Project has the potential to violate water quality standards or waste discharge requirements during operation. (Less than Significant with Mitigation)

The long-term operations of the proposed Project (all phases) could result in long-term impacts to surface water quality from urban stormwater runoff. The proposed Project would result in new impervious areas associated with roadways, driveways, parking lots, buildings, and landscape areas. Normal activities in these developed areas include the use of various automotive petroleum products (i.e. oil, grease, and fuel), common household hazardous materials, heavy metals, pesticides, herbicides, fertilizers, and sediment. Within urban areas, these pollutants are generally called nonpoint source pollutants. The pollutants pollutant levels vary based on factors such as time between storm events, volume of storm event, type of uses, and density of people.

The drainage collection system within the City of Manteca consists of gravity pipes, retention/detention/surge basins, pump station, force mains, outfalls, and irrigation canals/ditches. The collection system for the proposed project will be designed to contain the 10-year storm event within the pipe system and basins while maintaining one foot of freeboard. The streets will be designed in combination with the pipe system to convey the 100-year storm event to the basins and pump station in accordance with City standards. Early phases of development may to rely on temporary basins in order to delay the construction of the overall storm drainage system. The final design of all onsite and offsite storm drain infrastructure improvements is subject to the review and approval of the City of Manteca.

As shown in Figures 2.0-11a, 2.0-11b, 2.0-12a, and 2.0-12b, development of the proposed Project would include construction of a new storm drainage system, including a drainage collection system, storm drain pump stations, and detention basins. It is noted that the locations of the proposed detention basins are conceptual. Stormwater resulting from the future HDR portion of the Project would be diverted to the Oakwood Trails Subdivision storm drainage system, which will be developed adjacent west of the Project site in the future. The Oakwood Trails Subdivision includes two neighborhood park drainage basins, totaling approximately 15.67 acres.

An internal layout of stormwater collection pipes with various sizes, as necessary, will be installed within the Project site. All on-site storm drainage runoff will be collected through drain inlets in the landscaped areas and catch basins along the streets and within properties, and conveyed via surface swales and underground trunk lines to the detention and water quality basins. The conveyance systems and detention basins may include facilities designed to address water quality standards and requirements. Discharge from the basins will be conveyed through controlled flow pumping facilities to existing City of Manteca and SSJID dual use main storm drain laterals. The duration of the discharge will comply with City of Manteca standards. The water quality detention basins will be designed to comply with SWRCB and City of Manteca specifications and standards.

Stormwater quality standards imposed and monitored by the EPA and SWRCB through the City's stormwater NPDES permit require treatment of stormwater runoff prior to its release into the sloughs, creeks, rivers or the Delta. Treatment is often provided utilizing several options including treatment within individual lots and within detention basins in a separate "wet" area that is part

of, or adjacent, to the main basin. Other treatment may be provided by on-site source control and by site specific facilities.

The ongoing operational phase of the proposed Project requires the final discharge of stormwater into the on-site detention basins. The discharge of stormwater must be treated through BMPs prior to its discharge. The City of Manteca implements best management practices to the extent they are technologically achievable to prevent and reduce pollutants. Under the City's standard practices, the owner or operator of a commercial establishment shall provide reasonable protection from accidental discharge of prohibited materials or other wastes into the municipal storm drain system or watercourses. Facilities to prevent accidental discharge of prohibited materials or other wastes shall be provided and maintained at the owner or operator's expense.

Additionally, there are various non-structural and structural stormwater BMPs that can be implemented to reduce water pollution. Non-structural BMPs are typically aimed at prevention of pollution through public education and outreach. Non-structural BMPs include: school educational programs, newsletters, website information, commercial, billboards/advertisements, river cleanups, and storm drain stenciling. Structural BMPS are aimed at the physical collection, filtering, and detaining of stormwater. Structural BMPs include items such as drop inlet filters, vault filters, hydrodynamic separators, surface detention basins, and underground detention facilities.

The following mitigation measures would ensure that BMPs are implemented to reduce the amount of pollution in stormwater discharged from the Project site into the Delta during the operational phase of the project. The management of water quality through obtaining a General Industrial Stormwater Permit and implementing BMPs is intended to ensure that water quality does not degrade to levels that would violate water quality standards. These are existing regulatory requirements. Implementation of the proposed Project would have a ***less than significant*** impact relative to this topic.

MITIGATION MEASURE(S)

Mitigation Measure 3.9-1*: The Project applicant shall implement the following nonstructural BMPs that focus on preventing pollutants from entering stormwater:*

Pollution Prevention/Good Housekeeping

- *A spill response and prevention plan shall be developed as a component of (1) SWPPPs prepared for construction activities, (2) SWPPPs for facilities subject to the NPDES Stormwater Permit, and (3) spill prevention control and countermeasure plans for qualifying facilities. The spill response and prevention plan shall be implemented during all construction activities.*

- *Streets and parking lots in all non-residential portions of the Project site shall be swept at least once every two weeks.*

Operation and Maintenance (O&M) of Treatment Controls

- *An Operation and Maintenance (O&M) Plan shall be developed for the storm drainage facilities to ensure long-term performance. The O&M plan shall incorporate the manufacturers' recommended maintenance procedures and include (1) provisions for debris removal, (2) guidance for addressing public health or safety issues, and (3) methods and criteria for assessing the efficacy of the storm drainage system. An annual report shall be submitted to the City certifying that maintenance of the facilities was conducted according to the O&M plan.*

***Mitigation Measure 3.9-2**: The Project applicant shall implement the following structural BMPs that focus on preventing pollutants from entering stormwater, or alternative BMPs approved by the City of Manteca. Implementation of BMPs apply to all non-residential parcels including the right-of-way as appropriate.*

Extended Detention Facilities: Extended detention refers to the facilities proposed for the Project site that would detain and temporarily store stormwater runoff to reduce the peak rates of discharge to the storm drainage system. Detention of stormwater allows particles and other pollutants to settle and thereby potentially reduce concentrations and mass loading of contaminants in the discharge.

Grassed Swales: A swale is a vegetated, open channel management practice designed to treat and attenuate stormwater runoff for a specified water quality volume. Stormwater runoff flowing through these channels is treated by being filtered through vegetation in the channel, through a subsoil matrix, and/or through infiltration into the underlying soils. Swales can be used throughout the proposed Project area where feasible in the landscape design to treat parking lot runoff.

Proprietary Devices: There are a variety of commercially available stormwater treatment devices designed to remove contaminants from drainage once flows enter the conveyance systems. StormFilter™ units, or equivalent filtration-type systems, are recommended within the commercial and industrial areas as the main structural BMP for these areas. Bioswales are also recommended for streets and parking areas. Drop inlet filters should also be used to control drainage runoff water quality.

Impact 3.9-3: The proposed Project has the potential to substantially deplete groundwater supplies or interfere substantially with groundwater recharge. (Less than Significant)

The proposed Project would result in new impervious surfaces and could reduce rainwater infiltration and groundwater recharge. Infiltration rates vary depending on the overlying soil types. In general, sandy soils have higher infiltration rates and can contribute to significant amounts of ground water recharge; clay soils tend to have lower percolation potential; and impervious surfaces such as pavement significantly reduce infiltration capacity and increase surface water runoff.

Table 3.9-2 below identifies the soils in the Project site and the soils infiltration rate. The majority of Project site has soils all have a hydrologic rating of "A", which is indicative of soils having a high infiltration rate (low runoff potential) when thoroughly wet. The arents soils have a hydrologic rating of "C", which is indicative of soils having a low infiltration rate (high runoff potential).

TABLE 3.9-2: SOILS HYDROLOGIC RATING

SERIES	*DESCRIPTION*	*SOURCE MATERIAL*	*RATING*
Arents	Arents, saline-sodic	mixed rock sources	C
Delhi	Delhi loamy sand, MLRA 17	wind modified material weathered from granitic rock sources	A
Dello	Dello loamy sand, drained	alluvium derived from granitic rock sources	A
Grangeville	Grangeville fine sandy loam, partially drained	moderate coarse textured alluvium dominantly from granitic rock sources	A
Tinnin	Tinnin loamy coarse sand	alluvium derived from granitic rock sources	A

SOURCE: NCRS 2016.

The infiltration rate of the soils on the Project site is considered high. Development of the proposed Project site with impervious surfaces could reduce rainwater infiltration and groundwater recharge further. The park and open space areas totaling approximately 22.83 acres will remain largely pervious. The collection of rainwater for those areas of impervious surfaces will be routed into the proposed Project's storm drainage system and eventually flow into the San Joaquin River. The exact design of the drainage basin in not known at this time; therefore, it is not known whether the drainage basin will percolate or not (i.e. unlined or lined).

The project site is located in the Eastern San Joaquin County Groundwater Basin. The basin is not adjudicated; however, a basin management plan has been created. The ESJGB-GMP (NSJCGB, 2004) was prepared in September 2004. The purpose of the ESJGB-GMP is "to review, enhance, assess, and coordinate existing groundwater management policies and programs in Eastern San Joaquin County and to develop new policies and programs to ensure the long-term sustainability of groundwater resources in Eastern San Joaquin County." According to DWR Bulletin 118 (DWR, 2006), the ESJGB is in a critical condition of overdraft. Groundwater levels have declined in the basin since the 1960s with the lowest groundwater levels found in eastern San Joaquin County.

Most of the fresh groundwater is encountered at depths of less than 1,000 feet, and most of this shallow groundwater is unconfined. The Victor formation is the uppermost formation and extends from the ground surface to a maximum depth of about 150 feet. Compared to the underlying formations, the Victor formation is generally more permeable and the groundwater is typically unconfined. The underlying Laguna formation includes discontinuous lenses of unconsolidated to semi-consolidated sands and silts interspersed with lesser amounts of clay and gravel. The Laguna formation is hydraulically connected to the Victor formation and is estimated to be 750 to 1,000 feet thick. Moderate permeability has been reported within the Laguna formation with some

highly permeable coarse-grained beds. Most of the municipal and industrial wells in the Manteca area penetrate through the Victor formation into the Laguna formation.

The City's annual potable groundwater production has steadily increased historically, reaching a peak of 14,900 AF in 2004. Commissioning of the surface water treatment plant in 2005 decreased groundwater use considerably and currently supplies an average of 52 percent of the City's annual potable water supply. Since 2005, the City has constructed dedicated irrigation wells at many parks in an effort to reduce potable demand, which requires wellhead treatment at many wells for arsenic and other constituents to meet drinking water standards. In 2000, the City pumped about 1.2 AFY/acre, but this has since decreased to about 0.7 AFY/acre in 2010 and to about 0.5 AFY/acre in 2015.

While the Project site's soils have a range of high infiltration rate based on the relative percentage of sands, much of the groundwater recharge in the basin occurs in the sand and gravels along the San Joaquin River from Sierra snowmelt flowing downstream. Precipitation in the region is 13.81 inches, most of which falls between November through April. A portion of this annual rainfall infiltrates the soil and groundwater basin, while a portion is discharged downstream into the Delta. While the proposed Project would reduce the amount of pervious surfaces within the project site, much of the site would be converted to pervious surface.

For the reasons mentioned above, the proposed Project would not cause the substantial depletion of groundwater supplies or interfere substantially with groundwater recharge. As such, implementation of the proposed Project would have a **less than significant** impact relative to this topic.

Impact 3.9-4: The proposed Project has the potential to alter the existing drainage pattern in a manner which would result in substantial erosion, siltation, flooding, or polluted runoff. (Less than Significant)

Currently, runoff from within the Project site is collected in a system of shallow agricultural and roadside catch ponds. Public storm drain facilities are not currently installed in the agricultural fields.

Planned urbanization of the Project site would result in changes to land use, natural vegetation, and infiltration characteristics, and would introduce new sources of water pollutants, producing "urban runoff." Pollutants contained within urban runoff may include, but are not limited to sediment, oxygen-demanding substances (e.g., organic matter), nutrients (primarily nitrogen and phosphorus), heavy metals, bacteria, oil and grease, and toxic chemicals that can degrade receiving waters. Urban runoff pollutants may stem from erosion of disturbed areas, deposition of atmospheric particles derived from automobile or industrial sources, corrosion or decay of building materials, rainfall contact with toxic substances, decomposing plant materials, animal excrement, and spills of toxic materials on surfaces which receive rainfall and generate runoff. New residential uses within the Project site may also generate urban runoff from streets, driveways and parking areas. Yard areas may produce fertilizer wastes and/or bacterial contamination from animal

excrement. New urban commercial development can generate urban runoff from parking areas, as well as any areas of hazardous materials storage exposed to rainfall.

As previously stated, the 2013 SDMP provides a comprehensive planning document to guide improvement and expansion of the City's storm drainage system to meet current and future needs in a safe and reliable manner while maintaining compliance with all applicable regulations. Five planning zones have been identified to define the capital improvements needed to serve future growth: Zones 30, 32, 34, 36 and 39. With the exception of drainage Zone 39, all drainage zones are located in the SSJID service area. The Project site is located in Zone 39, and is not currently served by the SSJID. As a result, the 2013 SDMP identifies a conveyance and disposal system separate from SSJID facilities for this zone. For development in Zone 39, the 2013 SDMP identifies that separate facilities will be constructed to convey the runoff to one regional pump station that will discharge into Walthall Slough, which terminates into the San Joaquin River to the west. The discharge of stormwater must be treated through BMPs prior to its discharge.

However, as an alternative to the construction of a separate facility in Zone 39 to convey the runoff to a regional pump station that will discharge into Walthall Slough, the City of Manteca and the SSJID are currently working on a plan that will include the SSJID annexation Zone 39 (including the Project site) into the SSJID Service District 4. Under this framework the Project site would convey water to the FCOC; and eventually to the San Joaquin River.

The proposed stormwater collection system functions by attenuating its runoff before pumping it into either the French Camp Outlet Canal, or into the Walthall Slough. The City will use real-time water level monitoring stations at critical low points in the conveyance system complete with SCADA (Supervisory Control and Data Acquisition) facilities to determine when stormwater can be pumped into the Outlet Canal and when it must be retained.

The exact sizing of the underground piping and basin will be engineered during the preparation of the improvement plans. High groundwater can impact the effectiveness of detention basins. To the extent that groundwater enters the basins, the storage available for the runoff is diminished. The bottom of the basins will be designed to maintain a minimum of five feet of separation from groundwater or other design measures will be implemented such as impervious liners with sub drain systems.

With the design and construction of flood control improvements included in the proposed storm drainage system, the proposed Project would have a **less than significant** impact relative to this topic.

Impact 3.9-5 The proposed Project has the potential to otherwise substantially degrade water quality. (Less than Significant)

Water Quality Impacts from Discharges to 303(d) Listed Water Bodies: Section 303(d) of the federal Clean Water Act (CWA) requires States to identify waters that do not meet water quality standards or objectives and thus, are considered "impaired." Once listed, Section 303(d) mandates prioritization and development of a Total Maximum Daily Load (TMDL). The TMDL is a tool that establishes the allowable loadings or other quantifiable parameters for a waterbody and thereby

the basis for the States to establish water quality-based controls. The purpose of TMDLs is to ensure that beneficial uses are restored and that water quality objectives are achieved.

According to the California Water Quality Control Monitoring Council, which is part of California Environmental Protection Agency, Natural Resources, there are many areas within the San Joaquin County which are considered Section 303(d) impaired waterbodies. Those areas in the regional vicinity of the Project site that are impaired are referred as Delta Waterways (Southern Portion) by the Water Quality Control Monitoring Council. This includes 3,125 acres listed as early as 1996 for Chlorpyrifos (Agriculture, Urban Runoff/Storm Sewers), DDT (Agriculture), Diazinon (Agriculture, Urban Runoff/Storm Sewers), Electrical Conductivity (Agriculture), Group A Pesticides (Agriculture), Invasive Species (Source Unknown), Mercury (Resource Extraction), and Unknown Toxicity (Source Unknown).

The San Joaquin River is specifically listed by the Central Valley Regional Water Quality Control Board (CVRWQCB) as an impaired water body due to mercury under the Clean Water Act. Mercury is a sediment-based pollutant that can be released into the water column during various in-water construction activities (e.g., construction of the storm drain outfall) that may disturb the sediment and cause turbidity. As a result, such activities may increase the likelihood of mercury exposure to the public and wildlife that utilize the San Joaquin River.

In accordance with the NPDES Stormwater Program, Mitigation Measure 3.6-1 contained in Section 3.6 Geology and Soils requires an approved SWPPP designed to control erosion and the loss of topsoil to the extent practicable using BMPs that the RWQCB has deemed effective in controlling erosion, sedimentation, runoff during construction activities. Such BMPs may include: temporary erosion control measures such as silt fences, staked straw bales/wattles, silt/sediment basins and traps, check dams, geofabric, sandbag dikes, and temporary revegetation or other ground cover. The BMPs and overall SWPPP is reviewed by the Regional Water Quality Control Board as part of the permitting process. The SWPPP, once approved, is kept on site and implemented during construction activities and must be made available upon request to representatives of the RWQCB and/or the lead agency. The RWQCB has stated that these erosion control measures are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed. The specific controls are subject to the review and approval by the RWQCB.

The ongoing operational phase of the proposed Project (all phases) requires discharge of stormwater into the on-site detention basins, which would ultimately flow into the Delta. The discharge of stormwater must be treated through BMPs prior to its discharge. Mitigation Measures 3.9-1 and 3.9-2 would ensure that BMPs are implemented to reduce the amount of pollution in stormwater discharged from the Project site into the on-site detention basins, which would ultimately flow into the Delta during the operational phase of the project. There are various non-structural and structural stormwater BMPs that can be implemented to reduce water pollution. Non-structural BMPs are typically aimed at prevention of pollution through public education and outreach. Non-structural BMPs include: school educational programs, newsletters, website information, commercial, billboards/advertisements, river cleanups, and storm drain stenciling. Structural BMPS are aimed at the physical collection, filtering, and detaining of stormwater.

Structural BMPs include items such as drop inlet filters, vault filters, hydrodynamic separators, surface detention basins, and underground detention facilities. The management of water quality through obtaining a General Industrial Stormwater Permit and implementing BMPs is intended to ensure that water quality does not degrade to levels that would violate water quality standards.

The use of BMPs are intended to treat runoff close to the source during the construction and long term operational phase of the Project to reduce stormwater quality impacts. The mitigation measures listed below are existing regulatory requirements. Implementation of proposed Project would have a **less-than-significant** impact relative to this topic.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.6-1** and **Mitigation Measures 3.9-1 and 3.9-2**.*

Impact 3.9-6 Place housing or structures that would impede/redirect flows within a 100-year, or 200-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map. (Less than Significant with Mitigation)

As shown on Figure 3.9-2, the southernmost portion of the Project site is within the 100-year flood zone as delineated by FEMA. The remainder of the Project site is not located within the 100-year flood zone. The southernmost portion of the Project site would be preserved as open space as part of the Project and, as such, housing or structures would not be located within the 100-year flood zone.

While the majority of the Project site is not within the 100-year flood hazard area, the entire Project site does lie within the 200-year flood hazard area. State floodplain legislation (SB 5) for the San Joaquin River region has resulted in stricter development standards beginning in 2016. Urban areas that depend on levee protection are required to have a 200-year level of flood protection. SB 5 prohibits a city or county within the Central Valley Flood Protection Plan area from approving a development agreement, discretionary permit or entitlement, tentative map or parcel map for any property within a flood hazard zone unless they can demonstrate any of the following:

- the project has already achieved the applicable level of flood protection,
- conditions have been imposed on the project approval that will eventually result in the applicable level of flood protection, or
- adequate progress is being made towards achievement of the applicable level of flood protection.

Adequate progress is defined as meeting all of the following:

- The project scope, cost and schedule have been developed;
- In any given year, at least 90% of the revenues scheduled for that year have been appropriated and expended consistent with the schedule;

- Construction of critical features is progressing as indicated by the actual expenditure of budget funds;
- The city or county has not been responsible for any significant delay in completion of the system; and
- The above information has been provided to the DWR and the Central Valley Flood Protection Board and the local flood management agency shall annually report on the efforts to complete the project.

To account for new requirements imposed by SB 5, Reclamation District 17 (RD-17) is working with the DWR and the Central Valley Flood Protection Board (CVFPB) to analyze 200-year protection. RD-17 acquired land along the levee system to construct 100-year improvements, and that land is anticipated to provide sufficient space for any additional incremental improvements to provide 200-year protection in the future.

The City does not directly control levee improvements made by the RDs, however, land use decisions at the City are dependent upon these districts to make progress toward completing necessary upgrades to meet Urban Level of Flood Protection criteria. To address 200-year flood issues locally, Manteca has partnered with the City of Lathrop to complete the modeling and mapping of the 200-year flood plain, and has identified areas inundated by flooding and the depth of flooding.

Stemming from SB 5 requirements, Manteca and Lathrop have authorized expending a total of $2,787,440 towards preparation of a preliminary design for Urban Level of Flood Protection Compliance for Reclamation District No 17 levees on a schedule that will meet the requirements of SB-5. Further state and federal funding is currently being sought to provide adequate funding for necessary improvements.

Additionally, because the Project site is located within the 200-year flood zone, Subsection C of Section 17.30.040 of the Manteca Municipal Code applies to the Project:

> *The review authority shall not approve the execution of a development agreement, a tentative map, or a parcel map for which a tentative map is not required, or a discretionary permit or other discretionary entitlement that would result in the construction of a new building, or construction that would result in an increase in allowed occupancy for an existing building, or issuance of a ministerial permit that would result in the construction of a new residence for property that is located within the F-200 Zone unless the review authority finds, based on substantial evidence in the record, one of the following:*
>
> 1. *The facilities of the State Plan of Flood Control or other flood management facilities protect the property to the urban level of flood protection in urban and urbanizing areas;*

2. *The City has imposed conditions on a development agreement, map, permit, or entitlement that will protect the property to the urban level of flood protection in urban and urbanizing areas;*

3. *The local flood management agency has made adequate progress (as defined in California Government Code Section 65007) on the construction of a flood protection system that will result in flood protection equal to or greater than the urban level of flood protection in urban or urbanizing areas; or*

4. *The property is located in an area of potential flooding of three feet or less from a storm event that has a one in two hundred chance of occurring in any given year, from sources other than local drainage, in urban and urbanizing areas.*

The facilities of the State Plan of Flood Control or other flood management facilities do not currently protect the Project site. Through Mitigation Measure 3.9-3, the City has imposed a condition that will protect the Project site to the urban level of flood protection. As discussed above, the City of Manteca has made adequate progress (as defined in California Government Code Section 65007) on the construction of a flood protection system that will result in flood protection equal to or greater than the urban level of flood protection in urban or urbanizing areas. The Project site is located in an area of potential flooding of five feet or greater from a storm event that has a one in two hundred chance of occurring in any given year, from sources other than local drainage, in urban and urbanizing areas.

The City of Manteca will continue planning efforts to provide adequate funding for necessary improvements, pursuant to the SB 5 requirements. The City will then be required to design and construct the necessary improvements. Until the improvements are in place, the Project would not be constructed because the Project site is above the three-foot flood depth. This is a potentially significant impact. Implementation of the following mitigation measure would reduce this impact to a ***less than significant*** level.

MITIGATION MEASURE(S)

Mitigation Measure 3.9-3: *The Project site is located within the City of Manteca's F-200 zone, which makes it at risk from the 200-year flood. As such, the Project is subject to the Manteca Municipal Code Section 17.30.040 Subsection C which places construction limitations on development proposed in areas that are at risk of flooding under the 200-year storm. The Project applicant shall contribute the fair share fee to provide the urban level of flood protection for the Project site. In addition, there shall be no construction of a new residence or other structure that is located within the F-200 Zone unless the City finds, based on substantial evidence in the record, that the Project is consistent with the requirements of Manteca Municipal Code Section 17.30.040 Subsection C which is specifically in place to protect people and property from a 200-year flood.*

Impact 3.9-7 The proposed Project has the potential to expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam, seiche, tsunami, or mudflow. (Less than Significant)

A tsunami is a sea wave caused by a submarine earthquake, landslide, or volcanic eruption. Tsunami can cause catastrophic damage to shallow or exposed shorelines. The Project site is approximately 50 miles from San Francisco Bay and 70 miles from the coast, which is sufficiently distant to preclude effects from a tsunami.

Seiches are changes or oscillations of water levels within a confined water body. Seiches are caused by fluctuation in the atmosphere, tidal currents or earthquakes. The effect of this phenomenon is a standing wave that would occur when influences by the external causes. The Project site is not adjacent to any lakes that pose significant a risk from a seiche event.

A mudflow is a type of mass wasting or landslide, where earth and surface materials are rapidly transported downhill under the force of gravity. Mudflow events are caused by a combination of factors, including soil type, soil profile, precipitation, and slope. Mudflow may be triggered by heavy rainfall that the soil is not able to sufficiently drain or absorb. As a result of this super-saturation, soil and rock materials become unstable and eventually slide away from their existing location. Soils most susceptible to mudflow are saturated, loose, non-plastic, uniformly graded, and fine-grained sand deposits. The Project site is relatively flat making the potential of mudflows low.

The Project site is subject to flood inundation as a result of dam failure. Figure 3.9-4 shows areas that are susceptible to dam inundation. Dam failure is generally a result of structural instability caused by improper design or construction, instability resulting from seismic shaking, or overtopping and erosion of the dam. As discussed previously, larger dams that are higher than 25 feet or with storage capacities over 50 acre-feet of water are regulated by the California Dam Safety Act, which is implemented by the California Department of Water Resources, DSD. The DSD is responsible for inspecting and monitoring these dams. The Act also requires that dam owners submit to the California Office of Emergency Services inundation maps for dams that would cause significant loss of life or personal injury as a result of dam failure. The County Office of Emergency Services is responsible for developing and implementing a Dam Failure Plan that designates evacuation plans, the direction of floodwaters, and provides emergency information.

Regular inspection by DSD and maintenance by the dam owners ensure that the dams are kept in safe operating condition. As such, failure of these dams is considered to have an extremely low probability of occurring and is not considered to be a reasonably foreseeable event.

The Project site is subject to flood inundation as a result of levee failure. The levees protected the project site are maintained by Reclamation District 0017 (RD 17). The RD 17 levee system was originally constructed in the 1960's and substantially upgraded in 1988. In 1990 the RD 17 levee was accredited by FEMA, which removed large areas of Stockton, Lathrop, Manteca and the County from the 100-year floodplain.

Following the accreditation in 1990, standards for flood protection have been changing and in May 2007 FEMA extended an offer of a Provisionally Accredited Levee (PAL) Agreement for the RD 17 levee system. A PAL is a levee that meets the FEMA requirements for flood protection but requires additional supporting documentation. Since August 2007, RD 17 has been implementing improvements to the levee system and constructed a seepage berm (a bank of earth placed against the existing levee) along the east levee of the San Joaquin River with the RD 17 area. The purpose of these improvements is to meet the flood protection requirements of FEMA and maintain the levee accreditation. FEMA has determined based on the current condition of the levee and the additional supporting documentation, that the RD 17 levee will maintain its accreditation.

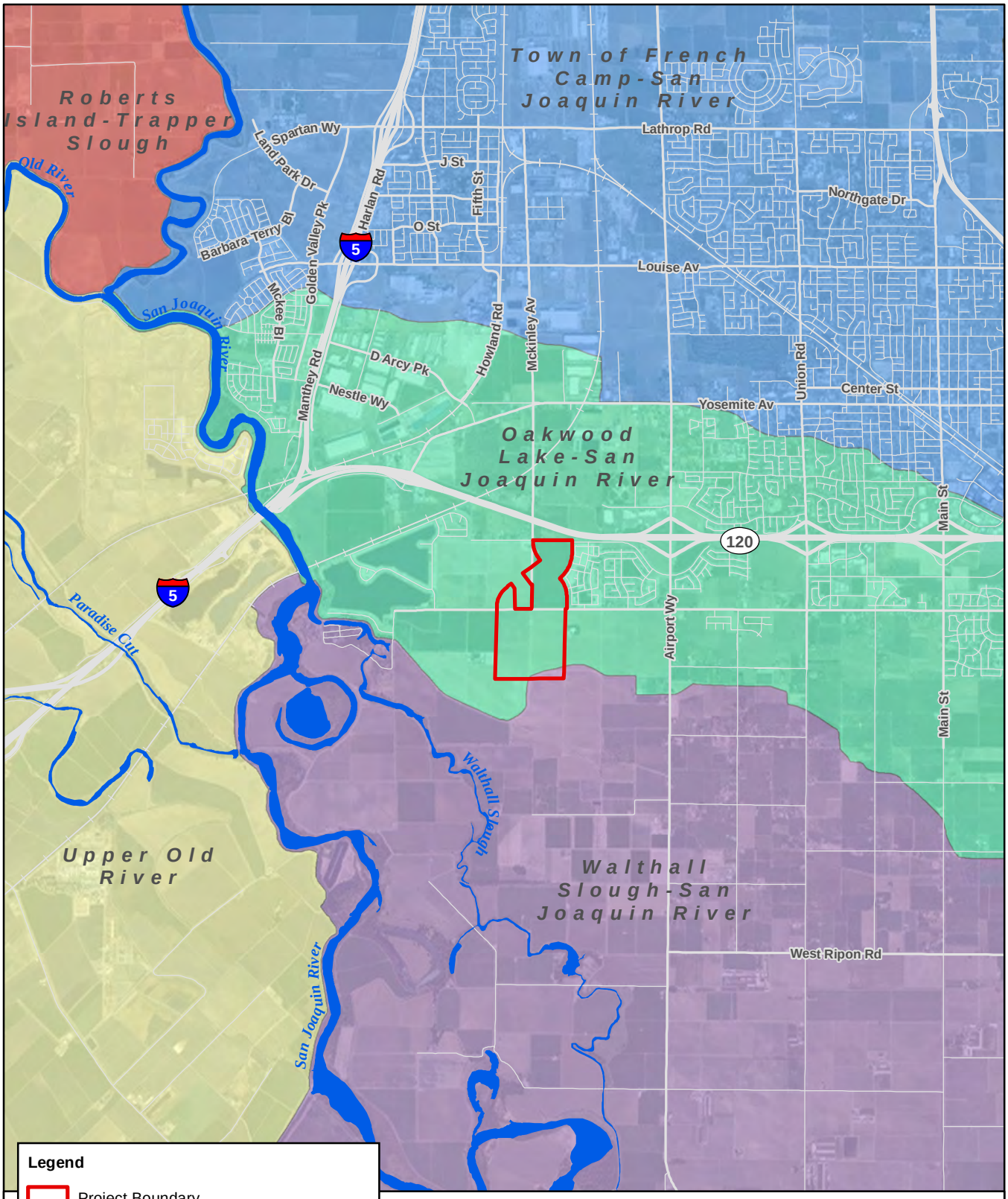
Regular inspection and maintenance by RD 17 ensure that the levees are kept in safe operating condition. As such, failure of the levee is considered to have an extremely low probability of occurring and is not considered to be a reasonably foreseeable event.

The proposed Project includes adequate ground surface distance from the existing RD 17 levee in the southern portion of the Project site in order to accommodate any effective flood water seepage drainage and/or any levee maintenance necessary. Additionally, the Project includes a minimum 50-foot setback back from the existing waterside levee toe, as shown in Figure 2.0-12b in Section 2.0.

The proposed Project would not result in the exposure people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam, seiche, tsunami, or mudflow. This impact is considered **less than significant**.

MITIGATION MEASURE(S)

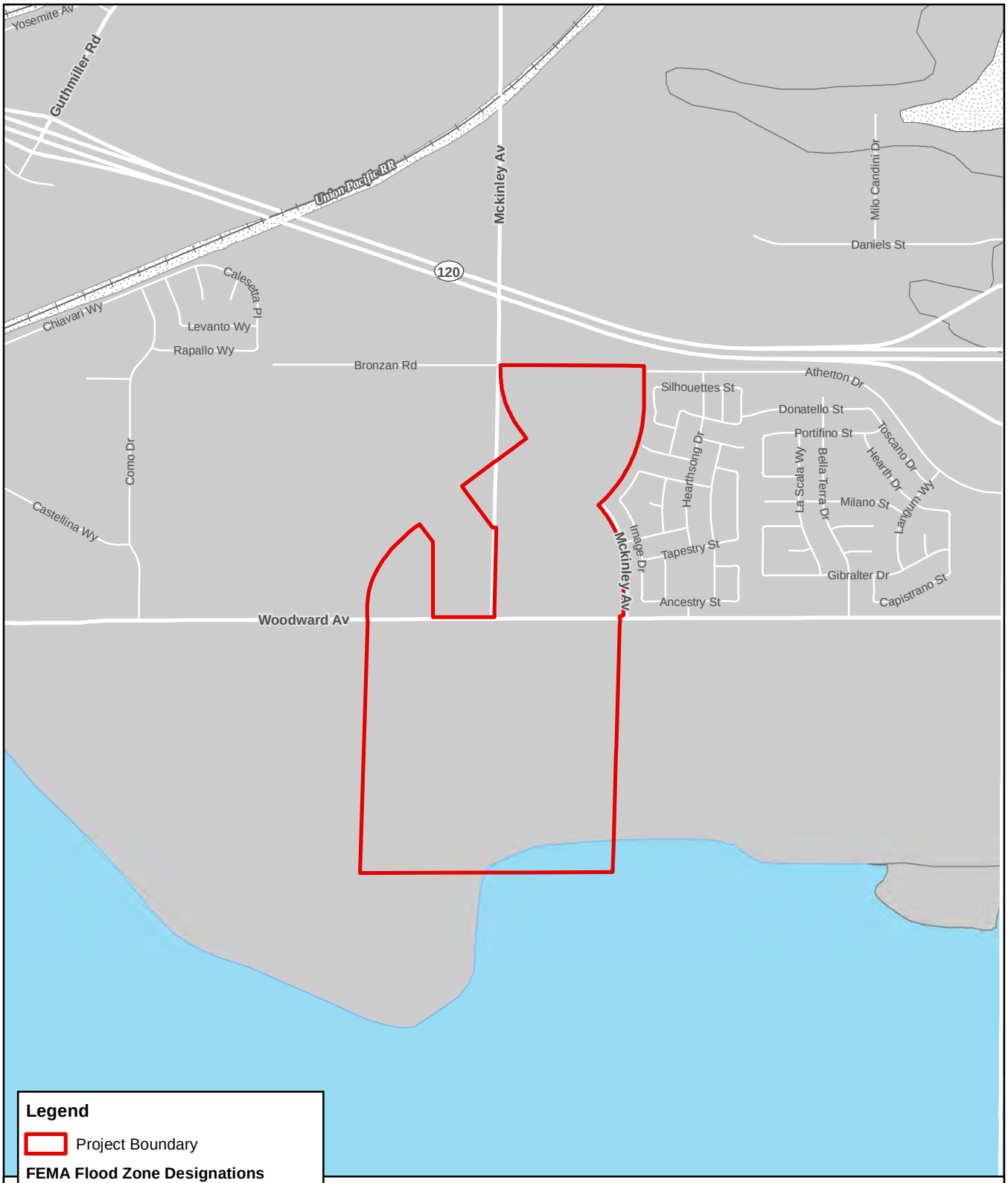
*Implement **Mitigation Measure 3.9-3**.*



OAKWOOD LANDING

Figure 3.9-1: Watershed Map

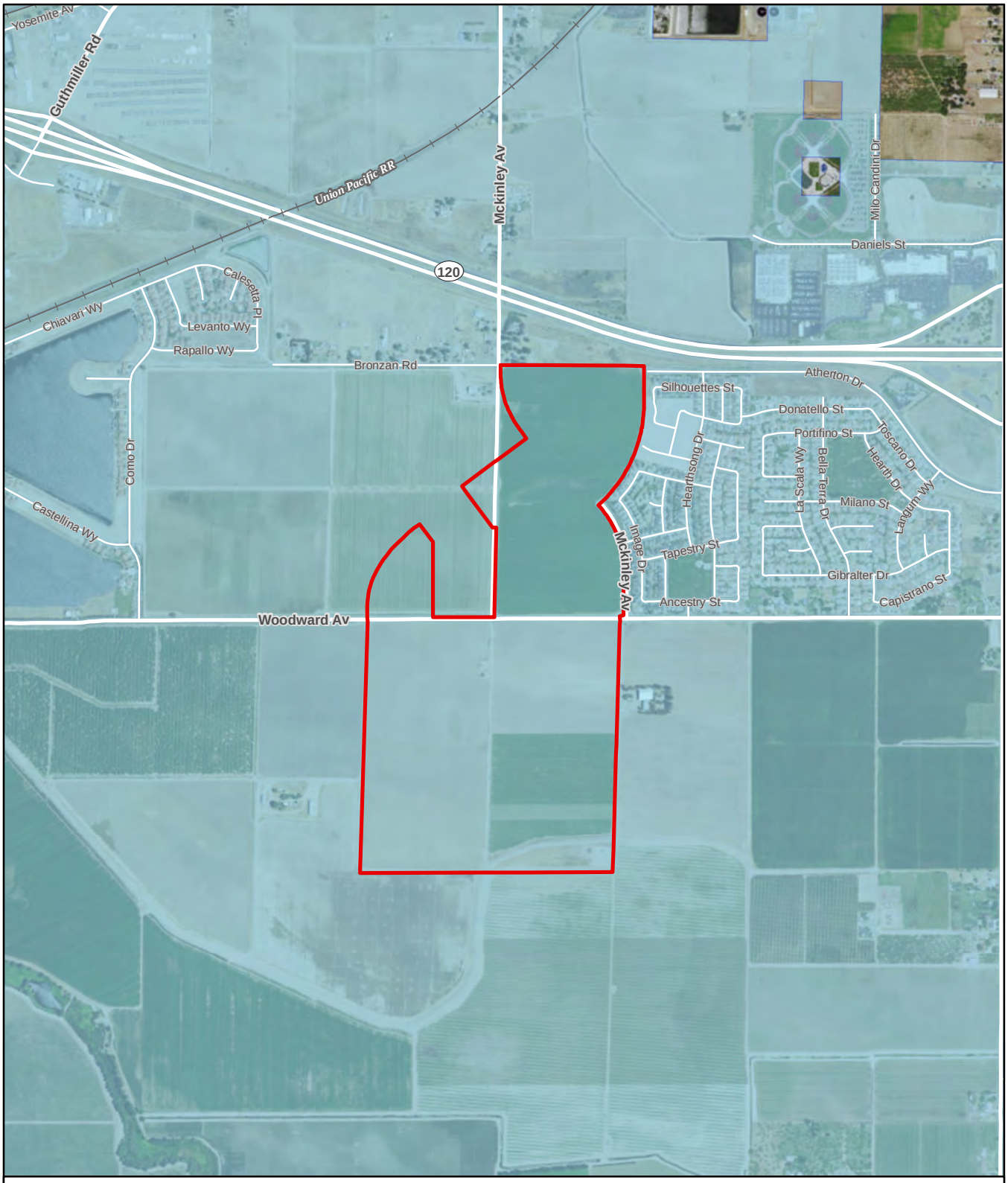
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OAKWOOD LANDING

Figure 3.9-2: Flood Zone Designations

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OAKWOOD LANDING

Figure 3.9-3: 200-Year Flood Plain

Legend

- Project Boundary
- 200-yr Composite Flood Plain

N

0 375 750

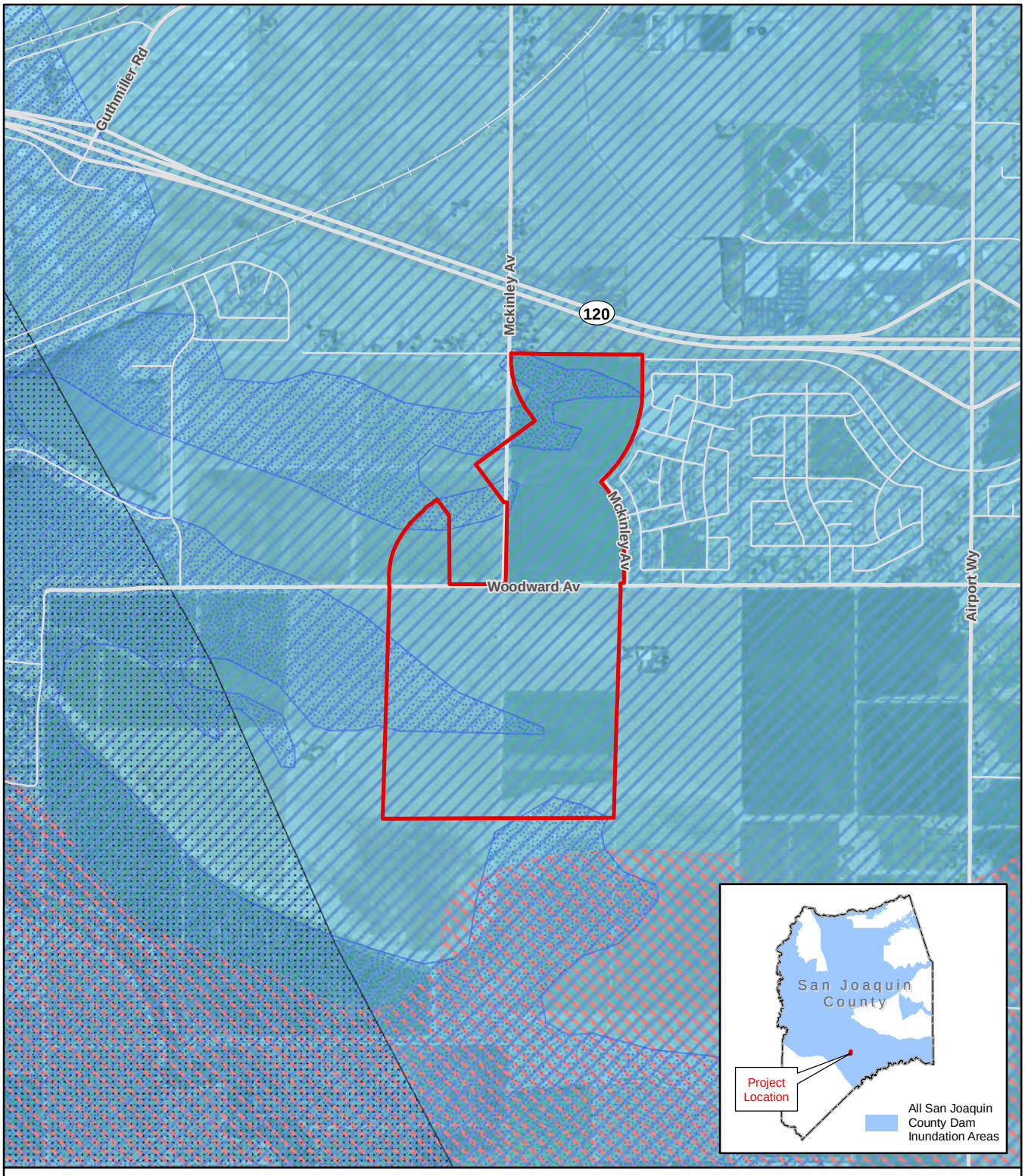
Feet

1:18,000

Sources: City of Manteca; San Joaquin County GIS; ArcGIS Online World Imagery map service. Map date: December 20, 2016.

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Legend

- Project Boundary

Dam Inundation Areas

- San Luis Dam
- Tulloch Dam
- New Melones Dam
- Lake McClure Dam
- Pine Flat Dam

N

0 500 1,000

Feet

1:20,000

OAKWOOD LANDING

Figure 3.9-4: Dam Inundation Areas

Sources: San Joaquin County GIS; California OES. Map date: July 18, 2016.

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This section describes the existing land uses on the Project site and in the surrounding area, describes the applicable land use regulations, and evaluates the environmental effects of implementation of the proposed Project related to land use, population, and housing. Information in this section is based on information provided in the Project materials, site surveys conducted by De Novo Planning Group in 2016, and the following reference documents: *City of Manteca General Plan 2023* (City of Manteca, as amended through 2016), City of Manteca *General Plan EIR* (City of Manteca, 2003), the City of Manteca Municipal Code, Title 17 - Zoning (City of Manteca, 2011), and the San Joaquin County General Plan (County of San Joaquin, 1992). There were no comments received during the NOP scoping process related to this environmental topic.

3.10.1 ENVIRONMENTAL SETTING

EXISTING PHYSICAL ENVIRONMENT

The City of Manteca is located in southern San Joaquin County, approximately 15 miles from Stockton and Tracy and 18 miles from Modesto. State Route 99 travels through Manteca near the eastern edge of the city and State Route 120 travels through the city near the southern edge of the city. Manteca occupies an area of just under 16 square miles.

Project Site

The Project site is located in the southwestern portion of the City of Manteca City Limits. The Project site is located south of State Route (SR) 120, approximately 2.8 miles southwest of downtown Manteca. Figures 2.0-1 and 2.0-2 found in Section 2.0 illustrate the regional location and Project vicinity.

The Project site has some existing improvements including an existing barn area with associated equipment, dirt and paved roadways, and irrigation ditches. The majority of the Project site is in active agricultural use. The barn structure is located in the central portion of the Project site. Additionally, Woodward Avenue traverses the center of the Project site from east to west, and McKinley Avenue traverses the northern portion of the Project site from north to south. Figure 2.0-5 shows aerial imagery of the current existing site uses within the Project site.

Surrounding Land Uses

The Project site is immediately southeast of the intersection of Bronzan Road and McKinley Avenue. The Project site is bounded on the north by an existing dirt roadway between Bronzan Road and Atherton Drive, on the east by South McKinley Avenue and an existing residential subdivision, on the south by existing agricultural fields, and on the west by existing agricultural fields and the future Atherton Drive right-of-way. Uses immediately adjacent to the east, south, and west of the Project site include agricultural and residential uses, including ranchettes and large estates lots. Other existing uses east of the northerly portion of the Project site include a single family residential subdivision west of South Airport Way. Existing and future residential

subdivisions also exist to the west of the Project site. Other nearby uses include rural residential uses north of the Project site and south of State Route (SR) 120.

DEMOGRAPHICS

Population Trends

The City experienced a population increase from 2000 to 2010 of 17,841 persons (36.2%) as shown in Table 3.10-1. During the period from 2010 to 2015, population continued to increase in the City, resulting in a total population of 73,787 in 2015.

TABLE 3.10-1: POPULATION GROWTH

YEAR	POPULATION	CHANGE	PERCENT CHANGE
2000	49,255		
2010	67,096	17,841	36.2%
2015	73,787	6,691	10.0%

SOURCES: US CENSUS, 2000, AND 2010; DOF, 2015.

Housing Stock

Table 3.10-2 summarizes the growth of the City's housing stock between 2000 and 2015. The number of housing units increased from 16,936 in 2000 to 23,132 in 2010. This represents 36.6 percent growth in the City's housing stock. The City's housing stock totaled 24,856 units in 2015.

TABLE 3.10-2: HOUSING UNIT GROWTH

YEAR	HOUSING UNITS	CHANGE	PERCENT CHANGE
2000	16,936		
2010	23,132	6,196	36.6%
2015	24,856	1,724	7.5%

SOURCES: US CENSUS 2000, AND 2010; DOF, 2015.

Persons Per Dwelling Unit

According the most recent U.S. Census (2014) and Department of Finance (2016) estimates, the average number of persons residing in a dwelling unit in the City of Manteca is 3.13.

3.10.2 REGULATORY SETTING

STATE

Government Code

California Government Code Section 65300 et seq. establishes the obligation of cities and counties to adopt and implement general plans. The general plan is a comprehensive, long-term, and general document that describes plans for the physical development of a jurisdiction and of any land outside its boundaries that, in the jurisdiction's judgment, bears relation to its planning. The general plan addresses a broad range of topics, including, at a minimum, land use, circulation, housing, conservation, open space, noise, and safety. In addressing these topics, the general plan

identifies the goals, objectives, policies, principles, standards, and plan proposals that support the jurisdiction's vision for the area. The general plan is a long-range document that typically addresses the physical character of an area over a 20-year period. Although the general plan serves as a blueprint for future development and identifies the overall vision for the planning area, it remains general enough to allow for flexibility in the approach taken to achieve the plan's goals.

The State Zoning Law (California Government Code Section 65800 et seq.) establishes that zoning ordinances, which are laws that define allowable land uses within a specific district, are required to be consistent with the general plan and any applicable specific plans. When amendments to the general plan are made, corresponding changes in the zoning ordinance may be required within a reasonable time to ensure the land uses designated in the general plan would also be allowable by the zoning ordinance (Government Code, Section 65860, subd. [c]).

LOCAL

City of Manteca General Plan

As noted above, General Plans are prepared under a mandate from the State of California, which requires each city and county to prepare and adopt a comprehensive, long-term general plan for its jurisdiction and any adjacent related lands. State law requires General Plans to address seven mandated components: circulation, conservation, housing, land use, noise, open space, and safety. In addition to those components required by State law, the Manteca General Plan also contains optional elements, including Community Design, Economic Development, Public Facilities and Services, and Air Quality.

The Manteca General Plan is comprehensive, long-range, and general. The Manteca General Plan has the following purposes:

- To identify the community's land use, transportation, environmental, economic and social goals and policies as they relate to land use, conservation and development.
- To enable the City Council and the Planning Commission to establish long-range conservation and development policies.
- To provide a basis for judging whether specific private development proposals and public projects are in harmony with these policies.
- To inform citizens, developers, decision makers, and other jurisdictions of the policies that will guide development and conservation within the City.

General Plan Land Use Map (2015): The Manteca General Plan Land Use Map portrays the ultimate uses of land in the City of Manteca through land use designations. The Land Use Map designates the Project site as Urban Reserve Business Industrial Park (UR-BIP Floor Area Ratio [FAR] 1.0), Urban Reserve Very Low Density Residential (UR-VLDR less than 2.0 dwelling units per acre [du/ac]), Business Industrial Park (BIP FAR 1.0), Commercial Mixed Use (CMU 15.1 to 25

du/ac), General Commercial (GC FAR 0.6), and Open Space (OS). Figure 2.0-6 in Section 2.0 depicts the Manteca General Plan land use designations for the Project site and the surrounding areas. The General Plan contains the following descriptions for these land uses:

UR-BIP (Urban Reserve Business Industrial Park): Urban Reserve is applied to many properties around the perimeter of the City. In most instances, the Urban Reserve category overlies another land use category.

UR-VLDR (Urban Reserve Very Low Density Residential): Urban Reserve is applied to many properties around the perimeter of the City. In most instances, the Urban Reserve category overlies another land use category.

BIP (Business Industrial Park): The BIP designation is intended to provide sites for large uses in an office park environment that would include multi-tenant buildings. Business parks of this nature are well suited for research and development facilities and also provide an attractive business environment for unrelated businesses. Typical uses permitted within the Business Industrial Park land use include: administrative and general office, corporate or regional headquarters, research and development facilities, medical offices, professional services such as attorneys, accountants and insurance, and light industrial, including manufacturing and assembly.

CMU (Commercial Mixed Use): The CMU designation will accommodate a variety of purposes including high density residential, employment centers, retail commercial, and professional offices.

GC (General Commercial): The GC designation provides for wholesale, warehousing, and heavy commercial uses, highway oriented commercial retail, public and quasi-public uses, and similar and compatible uses. The designation is also intended to accommodate visitor commercial, lodging, commercial recreation and public gathering facilities, such as amphitheaters, or public gardens.

OS (Open Space): The OS designation encompasses habitat, open space, natural areas, lands of special status species, wetlands and riparian areas. These areas are set aside as permanent open space preserves to protect environmentally sensitive areas.

City of Manteca General Plan Policies: General Plan policies associated with specific environmental topics (aesthetics, air quality, agriculture, biological resources, cultural resources, geology/soils/mineral resources, hazards, hydrology/water quality, noise, public services/recreation, transportation, utilities, etc.) are discussed in the relevant chapters of this EIR.

Municipal Code, Title 17 - Zoning

The purpose of Title 17, Zoning, of the City's Municipal Code is to protect and promote public health, safety, peace, comfort, convenience, prosperity, and general welfare and to regulate land use and development in accordance with the Manteca General Plan.

Zoning Map: The Zoning Map identifies zoning districts within the City at the parcel level. The Manteca Zoning Ordinance designates the Project site for Business Industrial Park (BIP), General

Commercial (CG), Commercial Mixed Use (CMU), Open Space (OS), and Undesignated (UND) uses. Below is a general description of City zoning within the Project site. The City zoning designations for the Project site and surrounding area are shown on Figure 2.0-7 in Section 2.0.

BIP Zone (Business Industrial Park): This designation creates large sites for office park environment that includes multi-tenant buildings. The BIP Zone will be well suited for research and development facilities and light industrial uses, as well as professional and medical offices. Warehouses will be permitted but limited in size. Specifically, this zone allows for research and development, small-scale manufacturing, business support service, and utility, transportation, communication, and public facility uses. The maximum FAR in the BIP Zone is 1.0 and the maximum building height is 35 feet.

CG Zone (General Commercial): This category provides for wholesale, warehousing, and heavy commercial uses, highway-oriented commercial retail, public and quasi-public uses, and similar and compatible uses. The CG Zone is also intended to accommodate visitor lodging, commercial recreation and public gathering facilities, such as amphitheaters, or public gardens. It also allows most neighborhood and mixed commercial uses. Specifically, this zone allows for animal-related uses, recreation and public assembly uses, retail/service uses, and utility, transportation, communication, and public facility uses. The maximum FAR in the CG Zone is 0.6.

CMU Zone (Commercial Mixed Use): This designation will accommodate a variety of uses including high-density residential, employment centers, retail commercial, and professional offices. Specifically, this zone allows for some residential uses, animal-related uses, recreation and public assembly uses, public transportation facility uses, and retail, service, and office uses. The allowed density in the CMU Zone is 15.1 to 25.0 du/ac and the maximum FAR is 1.0 and the maximum building height is 35 feet.

OS Zone (Open Space): This designation is set aside for habitat, open space, natural areas, lands of special-status species, wetlands, and riparian areas. These areas are set aside as permanent open space preserves to protect environmentally sensitive areas. This zone allows for community garden uses, outdoor commercial or community recreation uses, and resource protection and restoration uses.

UND Zone (Undesignated): The City's Zoning Ordinance does not contain allowed uses or development standards for the UND Zone.

San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMCP)

The San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP) provides comprehensive measures for compensation and avoidance of impacts on various biological resources, including agricultural land. One of the primary goals of the SJMSCP is to preserve productive agriculture where that goal is compatible with protecting and preserving lands with biological resources and habitat. The SJMSCP is administered by the San Joaquin Council of

Governments (SJCOG). The Project applicant will pay fees to SJCOG on a per-acre basis for designated agricultural lands and habitat that are converted to urban use. SJCOG will then use these funds to purchase conservation easements on agricultural and habitat lands in the region. The purchase of conservation easements allow the landowners to retain ownership of the land and continue agricultural operations, essentially preserving such lands in perpetuity. The Project site is designated as Category C/Pay Zone B. This zone consists of "Agricultural Habitat Lands", as described in Chapter 2.2 of the SJMSCP.

The City of Manteca is a permit holder and is responsible for local implementation responsibilities including collection of fees, maintenance of implementing ordinances/resolutions and coordinating with the JPA for annual reporting requirements.

3.10.3 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the proposed Project will have a significant impact on land use and planning if it will:

- Physically divide an established community;
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect;
- Conflict with any applicable habitat conservation plan or natural community conservation plan;
- Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure);
- Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere; and/or
- Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

IMPACTS AND MITIGATION MEASURES

Impact 3.10-1: The proposed Project would not physically divide an established community. (No Impact)

The Project site is located in the southwestern portion of the City of Manteca and is adjacent primarily to undeveloped agricultural land to the east, south, and west, and to developed areas to the north and northeast. Two approved residential subdivisions are planned adjacent west of the Project site. The Project site would result in an extension of developed uses within an area of the city that currently has approved development plans including Oakwood Trails development west

of the Project site. The Project would provide roadways and pedestrian pathways to connect the Project site to the existing circulation system and to allow access to and from the site. Development of the Project site would not result in physical barriers, such as a highway, wall, or other division, that would divide an existing community, but would serve as an orderly extension of existing and planned development. The Project would have **no impact** in regards to the physical division of an established community.

Impact 3.10-2: The proposed Project would not conflict with an applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project adopted to avoid or mitigate an environmental effect. (Less than Significant)

Land use plans, policies, and regulations that govern the land uses on the Project site and have jurisdiction over the Project include the Manteca General Plan, Manteca Municipal Code, and the SJCMSCP. Consistency with the SJMPSCP is discussed in Impact 3.10-3.

MANTECA GENERAL PLAN

Because general plans often contain numerous policies emphasizing differing legislative goals, a development project may be "consistent" with a general plan, taken as a whole, even though the project appears to be inconsistent or arguably inconsistent with some individual policies. (*Sequoyah Hills Homeowners Association v. City of Oakland* (1993) 23 Cal.App.4th 704, 719.) The proposed Project is consistent with the key land use issues and development concepts of the Manteca General Plan which provide for logical growth of the City, emphasize community form, scale, and identify, encourage attractive, sustainable neighborhoods, support public transit and bicycle and pedestrian circulation, encourage housing opportunity, promote employment and economic development, encourage a mix of land uses that balance public services and fiscal sustainability, and promote access to open space.

The Project site is located within the City limits and will provide for housing opportunities, employment-generating uses that will promote employment and economic development, and a mix of land uses. The Project applicant intends to provide an attractive and sustainable neighborhood within the city limits. The proposed Project is consistent with the General Plan land use policies that encourage an orderly pattern of development that is contiguous with the City boundary, require growth to contribute to a diversified economic base and balance between employment and housing opportunities, and allowing for recreation uses.

The land uses as proposed are not all consistent with the General Plan. When land uses are not consistent with a General Plan there are two courses of action: 1) the uses are not allowed due to the inconsistency, or 2) the land uses are changed through an amendment to the General Plan to create consistency. The proposed Project would require a City of Manteca General Plan Amendment to the Land Use Element to change land uses on the Project site. Changes to the Land Use Element would include changing approximately 121.67 acres of BIP to LDR uses; changing

approximately 70.0 acres of UR-BIP to LDR uses; changing approximately 9.39 acres of UR-VLDR to LDR uses; changing approximately 23.41 acres of CMU to LDR uses; changing approximately 11.59 acres of BIP to HDR uses; maintaining approximately 13.0 acres as GC; and maintaining approximately 6.77 acres of OS. The proposed General Plan land use changes are shown on Figure 2.0-9 in Section 2.0. Approval of the General Plan amendment would ensure that the proposed Project would be substantially consistent with the Manteca General Plan land use requirements and would have a **less than significant** impact relative to consistency with the Manteca General Plan. It is noted that consistency with Manteca General Plan policies and programs related to environmental topics other than land use (aesthetics, biological resources, cultural resources, geology/soils, hazards, hydrology/water quality, noise, public services, transportation, and utilities) are discussed in the relevant sections of this EIR.

MANTECA ZONING CODE

The Manteca Zoning Code implements the General Plan. The Project site is currently within the jurisdiction of the City of Manteca. The land uses as proposed are not consistent with the Manteca Zoning Code and, thus, the proposed Project would require a City of Manteca Zoning Amendment to change land uses on the Project site. Changes to the Zoning Map would include changing approximately 79.39 acres of UND to R-1 uses; changing approximately 121.67 acres of BIP to R-1 uses; changing approximately 23.41 acres of CMU to R-1 uses; approximately 11.59 acres of BIP to R-3 uses; maintaining approximately 13.0 acres as CG; and maintaining approximately 6.77 acres of OS. The proposed Zoning Amendment for the Project site is shown on Figure 2.0-10. These proposed zone changes would ensure that zoning would be consistent with the proposed General Plan designations within the Project site. The zoning ordinance establishes permitted uses, development densities and intensities, and development standards for each zone to ensure that public health, safety, and general welfare are protected, consistent with the purpose of the Zoning Code. All existing City development standards and zoning requirements for the proposed zoning are applicable to any activities on the Project site. The City will review each component of the proposed Project as plans (improvement plans, building plans, site plans, etc.) are submitted for final approval to ensure that they are consistent with the City's Zoning ordinance. Approval of the zone change would ensure that the proposed Project would be consistent with the Zoning Code and will have a **less than significant** impact relative to this topic.

As such, implementation of the proposed Project will have a **less than significant** impact relative to this topic.

Impact 3.10-3: The proposed Project would not significantly conflict with an applicable habitat conservation plan or natural community conservation plan. (Less than Significant)

SAN JOAQUIN COUNTY MULTI- SPECIES HABITAT CONSERVATION AND OPEN SPACE PLAN

The City's participation in the SJMSCP allows projects within Manteca's jurisdiction to seek coverage under the SJMSCP for impacts to endangered, threatened, and species of special

concern. The SJMSCP provides a process to offset impacts to biological resources, conserve open space, maintain the agricultural economy, and allow development within the County. It was also created to obtain the necessary 32 permits from the U.S. Fish and Wildlife Service and the California Department of Fish and Game for the next 50 years in exchange for participating projects paying mitigation fees. Fees are based on the amount and quality of land converted from agricultural or open space uses to urban uses. These fees are used to preserve and create habitats to be managed in perpetuity through the establishment of habitat preserves. Ninety-seven species are covered under the SJMSCP, with the intent to provide comprehensive mitigation pursuant to local, state, and federal regulations for impacts on these species from permitted activities under the Plan. Participation in the SJMSCP confers authorization for activities that result (or may result in) incidental take of covered state-listed species, federally listed species, and other covered.

As described in Section 3.4, Biological Resources, prior to issuance of grading permits, the Project proponent will be required to coordinate with SJCOG and will be responsible for the appropriate coverage, permits, compensatory mitigation or fees, and project-specific avoidance, minimization, and mitigation measures as defined within the SJMSCP. The proposed Project does not conflict with the implementation of the SJMSCP and has appropriate measures to ensure compliance with payment of mitigation fees. Implementation of the Project would have a **less than significant** impact relative to compliance with the SJMSCP.

Impact 3.10-4: The proposed Project has the potential to induce substantial population growth in an area. (Less than Significant)

Section 15126.2(d) of the CEQA Guidelines requires that an EIR evaluate the growth-inducing impacts of a proposed action. A growth-inducing impact is defined by the CEQA Guidelines as:

> *The way in which a proposed Project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth…It is not assumed that growth in an area is necessarily beneficial, detrimental, or of little significance to the environment.*

Based on the CEQA Guidelines, growth inducement is any growth that exceeds planned growth of an area and results in new development that would not have taken place without implementation of the project. A project can have direct and/or indirect growth inducement potential. Direct growth inducement would result if a project, for example, involved construction of new housing. A project would have indirect growth inducement potential if it established substantial new permanent employment opportunities (e.g., commercial, industrial, or governmental enterprises) or if it would involve a construction effort with substantial short-term employment opportunities that would indirectly stimulate the need for additional housing and services to support the new employment demand (*Napa Citizens for Honest Government v. Napa County Board of Supervisors* (2001) 91 Cal.App.4th 342). Similarly, a project would indirectly induce growth if it would remove an obstacle to additional growth and development, such as removing a constraint on a required

public service. A project providing an increased water supply or wastewater treatment/collection in an area where this service historically limited growth could be considered growth-inducing.

The State CEQA Guidelines further explain that the environmental effects of induced growth are considered indirect impacts of the proposed action. These indirect impacts or secondary effects of growth may result in significant, adverse environmental impacts. Potential secondary effects of growth include increased demand on other community and public services and infrastructure, increased traffic and noise, and adverse environmental impacts such as degradation of air and water quality, degradation or loss of plant and animal habitat, and conversion of agricultural and open space land to developed uses.

Growth inducement may constitute an adverse impact if the growth is not consistent with or accommodated by the land use plans and growth management plans and policies for the area affected. Local land use plans provide for land use development patterns and growth policies that allow for the orderly expansion of urban development supported by adequate urban public services, such as water supply, roadway infrastructure, sewer service, and solid waste service.

Components of Growth: The timing, magnitude, and location of land development and population growth in a region are based on various interrelated land use and economic variables. Key variables include regional economic trends, market demand for residential and non-residential uses, land availability and cost, the availability and quality of transportation facilities and public services, proximity to employment centers, the supply and cost of housing, and regulatory policies or conditions. Since the general plan of a community defines the location, type, and intensity of growth, it is the primary means of regulating development and growth in California.

GROWTH EFFECTS OF THE PROJECT

Direct Population Growth: The proposed Project proposes housing that would result in direct population growth. The proposed Project includes the addition of 1,265 residential units. Using the most recent U.S. Census (2014) and Department of Finance (2016) estimates for the average number of persons residing in a dwelling unit in the City of Manteca of 3.13, the addition of 1,265 housing units could increase the population of the city by an estimated 3,959 persons.

The proposed Project would require a General Plan amendment. Changes to the Land Use Element would include changing approximately 121.67 acres of BIP to LDR uses; changing approximately 70.0 acres of UR-BIP to LDR uses; changing approximately 9.39 acres of UR-VLDR to LDR uses; changing approximately 23.41 acres of CMU to LDR uses; changing approximately 11.59 acres of BIP to HDR uses; maintaining approximately 13.0 acres as GC; and maintaining approximately 6.77 acres of OS. The proposed General Plan land use changes are shown on Figure 2.0-9 in Section 2.0.

The Manteca General Plan designates land uses to ensure a balance between new residential development and jobs-creating uses. The Housing Element of the Manteca General Plan identifies that the City has capacity for 5,782 residential units on vacant and underdeveloped sites within the City limits based on current land uses. The proposed Project would result in direct population

growth beyond the what was planned for the Project site in the General Plan, but not beyond the City's capacity; the Project would result in an increase of the total number of units anticipated under the General Plan by approximately 1,247 units. The net population increase associated with the increase of units is anticipated to be 3,903 persons. [1]

Indirect Population Growth: As described above, projects that include employment generating uses have the potential to result in indirect population growth through the creation of jobs or the extension of infrastructure into areas that were not previously served. The proposed infrastructure improvements would be adequately sized to serve the proposed Project only. The proposed infrastructure would not be oversized to accommodate any growth beyond the Project site into areas that were not previously served.

Implementation of the propose Project would provide job growth to the area. It is anticipated that local employment would be increased to provide administrative, management, visitor-serving areas, and retail services. The proposed Project is expected to require both full-time and part-time employees. It is anticipated that the employment growth would be met both by existing residents and through the attraction of new residents. The proposed Project would eliminate the CMU and BIP uses assumed under the General Plan from the Project site. This would significantly decrease the employment opportunities assumed for the Project site under the General Plan; thus, the indirect population growth resulting from the proposed 13.0-acre general commercial area would be significantly less than the planned uses for the Project site anticipated under the General Plan.

The proposed Project would establish a variety of business opportunities that can support the skilled and educated workforce of Manteca and the local area. The Manteca General Plan anticipated the Project site for UR-BIP, UR-VLDR, BIP, CMU, GC, and OS uses. The proposed Project would require a City of Manteca General Plan Amendment to the Land Use Element to change land uses on the Project site. Changes to the Land Use Element would include changing approximately 121.67 acres of BIP to LDR uses; changing approximately 70.0 acres of UR-BIP to LDR uses; changing approximately 9.39 acres of UR-VLDR to LDR uses; changing approximately 23.41 acres of CMU to LDR uses; changing approximately 11.59 acres of BIP to HDR uses; maintaining approximately 13.0 acres as GC; and maintaining approximately 6.77 acres of OS. This change would result in an overall net increase in total residents under buildout of the General Plan; additionally, the elimination of the previously-designated CMU and BIP uses resulting from the Project would significantly decrease the number of jobs within the City.

Conclusion: The Housing Element of the Manteca General Plan identifies that the City has capacity for 4,922 residential units on vacant and underdeveloped sites. The proposed Project would result in direct population growth. The proposed Project would not result in indirect population growth

[1] Assumes 1.9 UR-VLDR density for assumed development and 3.13 persons per household.

beyond what was anticipated under the General Plan. Therefore, the proposed Project is not anticipated to exceed the planned growth (directly or indirectly) in the area beyond what is anticipated in the City of Manteca General Plan. While the proposed Project will result in growth, it is not anticipated to significantly induce growth. Implementation of the proposed Project will have a **less than significant** impact relative to this topic.

Impact 3.10-5: The proposed Project has the potential to displace substantial numbers of people or existing housing. (Less than Significant)

There is one barn structure located on the Project site. However, the barn appears abandoned and likely does not house any residents. Development of the Project would remove the onsite barn, and would add 1,265 residential units. Therefore, the Project would not displace substantial numbers of people or existing housing. The Project will have a **less than significant** impact related to the displacement of substantial numbers of people or existing housing.

This section provides a general description of the existing noise sources in the Project vicinity, a discussion of the regulatory setting, and identifies potential noise impacts associated with the proposed Project. Project impacts are evaluated relative to applicable noise level criteria and to the existing ambient noise environment. Mitigation measures have been identified for significant noise-related impacts.

3.11.1 ENVIRONMENTAL SETTING

KEY TERMS

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given area consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of noise.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, defined as ten times the logarithm of the ratio of the sound pressure squared over the reference pressure squared.
CNEL	Community noise equivalent level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic acoustic signal, expressed in cycles per second or Hertz.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
L_{dn}	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
L_{eq}	Equivalent or energy-averaged sound level.
L_{max}	The highest root-mean-square (RMS) sound level measured over a given period of time.
$L_{(n)}$	The sound level exceeded a described percentile over a measurement period. For instance, an hourly L_{50} is the sound level exceeded 50 percent of the time during the one hour period.
Loudness	A subjective term for the sensation of the magnitude of sound.
Noise	Unwanted sound.
SEL	Sound exposure levels. A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy into a one-second event.

FUNDAMENTALS OF ACOUSTICS

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second or Hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals), as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels, but are expressed as dB, unless otherwise noted.

The decibel scale is logarithmic, not linear. In other words, two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70 dBA sound is half as loud as an 80 dBA sound, and twice as loud as a 60 dBA sound.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptor, L_{dn}, and shows very good correlation with community response to noise.

The day/night average level (L_{dn}) is based upon the average noise level over a 24-hour day, with a +10 decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-

hour average, it tends to disguise short-term variations in the noise environment. CNEL is similar to L_{dn}, but includes a +5 dB penalty for evening noise. Table 3.11-1 lists several examples of the noise levels associated with common situations.

TABLE 3.11-1: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	*NOISE LEVEL (DBA)*	*COMMON INDOOR ACTIVITIES*
	--110--	Rock Band
Jet Fly-over at 300 m (1,000 ft)	--100--	
Gas Lawn Mower at 1 m (3 ft)	--90--	
Diesel Truck at 15 m (50 ft), at 80 km/hr (50 mph)	--80--	Food Blender at 1 m (3 ft) Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft)	--70--	Vacuum Cleaner at 3 m (10 ft)
Commercial Area Heavy Traffic at 90 m (300 ft)	--60--	Normal Speech at 1 m (3 ft)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing

SOURCE: CALTRANS, TECHNICAL NOISE SUPPLEMENT, TRAFFIC NOISE ANALYSIS PROTOCOL. NOVEMBER 2009.

EFFECTS OF NOISE ON PEOPLE

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction;
- Interference with activities such as speech, sleep, and learning; and
- Physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so-called ambient noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a 1 dBA change cannot be perceived;
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference;
- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and

- A 10 dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

Stationary point sources of noise – including stationary mobile sources such as idling vehicles – attenuate (lessen) at a rate of approximately 6 dB per doubling of distance from the source, depending on environmental conditions (i.e. atmospheric conditions and either vegetative or manufactured noise barriers, etc.). Widely distributed noises, such as a large industrial facility spread over many acres, or a street with moving vehicles, would typically attenuate at a lower rate.

EXISTING NOISE LEVELS

Existing and Surrounding Land Uses

The Project site has some existing improvements including an existing barn area with associated equipment, dirt and paved roadways, and irrigation ditches. The majority of the Project site is in active agricultural use. The barn structure is located in the central portion of the Project site. Additionally, Woodward Avenue traverses the center of the Project site from east to west, and McKinley Avenue traverses the northern portion of the Project site from north to south. Figure 2.0-5 in Section 2.0 shows aerial imagery of the existing site uses within the Project site.

Uses immediately adjacent to the east, south, and west of the Project site include agricultural and residential uses, including ranchettes and large estates lots. Other existing uses east of the northerly portion of the Project site include a single family residential subdivision west of S. Airport Way. Existing and future residential subdivisions also exist to the west of the Project site. Other nearby uses include rural residential uses north of the Project site and south of State Route (SR) 120.

Existing Ambient Noise Levels

To quantify the existing ambient noise environment in the Project vicinity, short-term and continuous (24-hour) noise level measurements were conducted on the Project site on May 24 and 25, 2016. The noise measurement locations are shown on Figure 3.11-1. The noise level measurement survey results are provided in Table 3.11-2. Appendix B of Appendix D shows the complete results of the continuous noise monitoring at Site A and Site B.

The sound level meters were programmed to collect hourly noise level intervals at each site during the survey. The maximum value (L_{max}) represents the highest noise level measured during an interval. The average value (L_{eq}) represents the energy average of all of the noise measured during an interval. The median value (L_{50}) represents the sound level exceeded 50 percent of the time during an interval.

Larson Davis Laboratories (LDL) Model 820 and 824 precision integrating sound level meters were used for the ambient noise level measurement survey. The meters were calibrated before and after use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the

measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4).

TABLE 3.11-2: SUMMARY OF EXISTING BACKGROUND NOISE MEASUREMENT DATA

SITE	LOCATION	L_{DN}	AVERAGE MEASURED HOURLY NOISE LEVELS, dB					
			DAYTIME (7AM-10PM)			NIGHTTIME (10PM-7AM)		
			L_{EQ}	L_{50}	L_{MAX}	L_{EQ}	L_{50}	L_{MAX}
CONTINUOUS (24-HOUR) NOISE LEVEL MEASUREMENTS								
A	North border of site	66	61	60	73	60	58	71
SHORT-TERM NOISE LEVEL MEASUREMENTS								
1	Northeast border of site	N/A	49	48	65	1:24 PM – Roadway traffic		
2	Southeast border of site	N/A	51	48	65	3:18 PM – Roadway traffic, wind, farming machinery		
3	Southwest border of site	N/A	62	50	78	1:52 PM – Roadway traffic		
4	Northwest border of site	N/A	56	50	73	2:55 PM – Roadway traffic and wind		

SOURCE: J.C. BRENNAN & ASSOCIATES, INC., 2016.

EXISTING ROADWAY NOISE LEVELS

To predict existing noise levels due to traffic, the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used. The model is based upon the Calveno reference noise emission factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The FHWA model was developed to predict hourly L_{eq} values for free-flowing traffic conditions.

Traffic volumes for existing conditions were obtained from the traffic data prepared for the Project (Fehr & Peers). Truck percentages and vehicle speeds on the local area roadways were estimated from field observations.

Traffic noise levels are predicted at the sensitive receptors located at the closest typical setback distance along each Project-area roadway segment. Where traffic noise barriers are predominately along a roadway segment, a -5 offset was added to the noise prediction model to account for various noise barrier heights. A -5 dB offset was also applied where outdoor activity areas are shielded by intervening buildings. In some locations, sensitive receptors may be located at distances which vary from the assumed calculation distance and may experience shielding from intervening barriers or sound walls. However, the traffic noise analysis is believed to be representative of the majority of sensitive receptors located closest to the Project-area roadway segments analyzed in this report.

Table 3.11-3 shows the existing traffic noise levels in terms of L_{dn} at closest sensitive receptors along each roadway segment. A complete listing of the FHWA Model input data is contained in Appendix B of Appendix D.

TABLE 3.11-3: EXISTING TRAFFIC NOISE LEVELS AND DISTANCES TO CONTOURS

ROADWAY	*SEGMENT*	*EXTERIOR TRAFFIC NOISE LEVEL, DB L_{DN}*
Airport Way	N. of Yosemite Ave.	65.6
Airport Way	Yosemite Ave. to Daniels St.	67.9
Airport Way	Atherton Dr. to Woodward Ave.	62.6
Airport Way	S. of Woodward Ave.	58.4
McKinley Ave.	Yosemite Ave. to Bronzan Rd.	62.8
Union Rd.	N. of SR 120	63.9
Union Rd.	Atherton Dr. to Woodward Ave.	54.6
Union Rd.	South of Woodward Ave.	59.9
Woodward Ave.	W. of McKinley Ave.	46.3
Woodward Ave.	McKinley Ave.to Airport Way	55.6
Woodward Ave.	Airport Way to Union Rd.	60.1
Woodward Ave.	E. of Union Rd.	60.4
Yosemite Ave.	W. of McKinley Ave.	60.1
Yosemite Ave.	McKinley Ave.to Airport Way	61.9
Yosemite Ave.	Airport Way to Union Rd.	67.8

SOURCE: FHWA-RD-77-108 WITH INPUTS FROM FEHR & PEERS, AND J.C. BRENNAN & ASSOCIATES, INC., 2016.

3.11.2 REGULATORY SETTING

FEDERAL

There are no federal regulations related to noise that apply to the proposed Project.

STATE

California Environmental Quality Act

The California Environmental Quality Act (CEQA) Guidelines, Appendix G, indicate that a significant noise impact may occur if a project exposes persons to noise or vibration levels in excess of local general plans or noise ordinance standards, or cause a substantial permanent or temporary increase in ambient noise levels. CEQA standards are discussed more below under the Thresholds of Significance criteria section.

California State Building Codes

The State Building Code, Title 24, Part 2 of the State of California Code of Regulations establishes uniform minimum noise insulation performance standards to protect persons within new buildings which house people, including hotels, motels, dormitories, apartment houses and dwellings other

than single-family dwellings. Title 24 mandates that interior noise levels attributable to exterior sources shall not exceed 45 dB L_{dn} or CNEL in any habitable room.

Title 24 also mandates that for structures containing noise-sensitive uses to be located where the L_{dn} or CNEL exceeds 60 dB, an acoustical analysis must be prepared to identify mechanisms for limiting exterior noise to the prescribed allowable interior levels. If the interior allowable noise levels are met by requiring that windows be kept closed, the design for the structure must also specify a ventilation or air conditioning system to provide a habitable interior environment

CITY OF MANTECA

City of Manteca General Plan

The City of Manteca General Plan Noise Element contains goals, policies, and implementation measures for assessing noise impacts within the City. Listed below are the noise goals, policies, and implementation measures that are applicable to the proposed Project (City of Manteca as amended through 2016):

GOALS: NOISE

- N-1. Protect the residents of Manteca from the harmful and annoying effects of exposure to excessive noise.
- N-3. Ensure that the downtown core noise levels remain acceptable and compatible with commercial and higher density residential land uses.
- N-4. Protect public health and welfare by eliminating existing noise problems where feasible, by establishing standards for acceptable indoor and outdoor noise, and by preventing significant increases in noise levels.
- N-5. Incorporate noise considerations into land use planning decisions, and guide the location and design of transportation facilities to minimize the effects of noise on adjacent land uses.

POLICIES: NOISE

- N-P-2. New development of residential or other noise-sensitive land uses will not be permitted in noise-impacted areas unless effective mitigation measures are incorporated into the project design to satisfy the performance standards in Table 9-1 [Table 3.11-4].
- N-P-3. The City may permit the development of new noise-sensitive uses only where the noise level due to fixed (non-transportation) noise sources satisfies the noise level standards of Table 9-2 [Table 3.11-5]. Noise mitigation may be required to meet Table 9-2 [Table 3.11-5] performance standards.
- N-P-5. In accord with the Table 9-2 [Table 3.11-5] standards, the City shall regulate construction-related noise impacts on adjacent uses.

TABLE 3.11-4: MAXIMUM ALLOWABLE NOISE EXPOSURE MOBILE NOISE SOURCES

LAND USE[4]	*OUTDOOR ACTIVITY AREAS*[1]	*INTERIOR SPACES*	
		L_{DN}/CNEL, dB	L_{EQ}/CNEL, dB[3]
Residential	60[2]	45	--
Transient Lodging	60[2]	45	--
Hospitals, Nursing Homes	60[2]	45	--
Theatres, Auditoriums, Music Halls	--	--	35
Churches, Music Halls	60[2]	--	40
Office Buildings	65	--	45
Schools, Libraries, Museums	--	--	45
Playgrounds, Neighborhood Parks	70	--	--

NOTES: [1] OUTDOOR ACTIVITY AREAS FOR RESIDENTIAL DEVELOPMENT ARE CONSIDERED TO BE BACKYARD PATIOS OR DECKS OF SINGLE FAMILY DWELLINGS, AND THE COMMON AREAS WHERE PEOPLE GENERALLY CONGREGATE FOR MULTI-FAMILY DEVELOPMENTS. OUTDOOR ACTIVITY AREAS FOR NON-RESIDENTIAL DEVELOPMENTS ARE CONSIDERED TO BE THOSE COMMON AREAS WHERE PEOPLE GENERALLY CONGREGATE, INCLUDING PEDESTRIAN PLAZAS, SEATING AREAS, AND OUTSIDE LUNCH FACILITIES. WHERE THE LOCATION OF OUTDOOR ACTIVITY AREAS IS UNKNOWN, THE EXTERIOR NOISE LEVEL STANDARD SHALL BE APPLIED TO THE PROPERTY LINE OF THE RECEIVING LAND USE.

[2] IN AREAS WHERE IT IS NOT POSSIBLE TO REDUCE EXTERIOR NOISE LEVELS TO 60 DB L_{DN} OR BELOW USING A PRACTICAL APPLICATION OF THE BEST NOISE-REDUCTION TECHNOLOGY, AN EXTERIOR NOISE LEVEL OF UP TO 65 L_{DN} WILL BE ALLOWED.

[3] DETERMINED FOR A TYPICAL WORST-CASE HOUR DURING PERIODS OF USE.

[4] WHERE A PROPOSED USE IS NOT SPECIFICALLY LISTED ON THE TABLE, THE USE SHALL COMPLY WITH THE NOISE EXPOSURE STANDARDS FOR THE NEAREST SIMILAR USE AS DETERMINED BY THE CITY.

SOURCE: CITY OF MANTECA GENERAL PLAN, NOISE ELEMENT, TABLE 9-1.

TABLE 3.11-5: PERFORMANCE STANDARDS FOR STATIONARY NOISE SOURCES OR PROJECTS AFFECTED BY STATIONARY NOISE SOURCES [1,2]

NOISE LEVEL DESCRIPTOR	*DAYTIME (7 AM – 10 PM)*	*NIGHTTIME (10 PM – 7 AM)*
Hourly L_{eq}, dB	50	45
Maximum Level, dB	70	65

NOTES: [1] EACH OF THE NOISE LEVELS SPECIFIED ABOVE SHOULD BE LOWERED BY FIVE (5) DB FOR SIMPLE NOISE TONES, NOISES CONSISTING PRIMARILY OF SPEECH OR MUSIC, OR RECURRING IMPULSIVE NOISES. SUCH NOISES ARE GENERALLY CONSIDERED BY RESIDENTS TO BE PARTICULARLY ANNOYING AND ARE A PRIMARY SOURCE OF NOISE COMPLAINTS.

[2] NO STANDARDS HAVE BEEN INCLUDED FOR INTERIOR NOISE LEVELS. STANDARD CONSTRUCTION PRACTICES SHOULD, WITH THE EXTERIOR NOISE LEVELS IDENTIFIED, RESULT IN ACCEPTABLE INTERIOR NOISE LEVELS.

SOURCE: CITY OF MANTECA GENERAL PLAN, NOISE ELEMENT, TABLE 9-2.

IMPLEMENTATION MEASURES: NOISE

- N-I-1. New development in residential areas with an actual or projected exterior noise level of greater than 60 dB L_{dn} will be conditioned to use mitigation measures to reduce exterior noise levels to less than or equal to 60 dB L_{dn}.
- N-I-3. In making a determination of impact under the California Environmental Quality Act (CEQA), a substantial increase will occur if ambient noise levels are increased by 10 dB or more. An increase from 5-10 dB may be substantial. Factors to be considered in determining the significance of increases from 5-10 dB include:
    - the resulting noise levels

- the duration and frequency of the noise
- the number of people affected
- the land use designation of the affected receptor sites
- public reactions or controversy as demonstrated at workshops or hearings, or by correspondence
- prior CEQA determinations by other agencies specific to the project

- N-I-4. Control noise at the source through use of insulation, berms, building design and orientation, buffer space, staggered operating hours and other techniques. Use noise barriers to attenuate noise to acceptable levels.

City of Manteca Municipal Code Noise Ordinance

Section 9.52.030 of the City of Manteca Municipal Code prohibits excessive or annoying noise or vibration to residential and commercial properties in the City. The following general rules are outline in the ordinance:

9.52.030 PROHIBITED NOISES — GENERAL STANDARD

No person shall make, or cause to suffer, or permit to be made upon any public property, public right-of-way or private property, any unnecessary and unreasonable noises, sounds or vibrations which are physically annoying to reasonable persons of ordinary sensitivity or which are so harsh or so prolonged or unnatural or unusual in their use, time or place as to cause or contribute to the unnecessary and unreasonable discomfort of any persons within the neighborhood from which said noises emanate or which interfere with the peace and comfort of residents or their guests, or the operators or customers in places of business in the vicinity, or which may detrimentally or adversely affect such residences or places of business. (Ord. 1374 § 1(part), 2007)

17.58.050 D. EXEMPT ACTIVITIES

8. Construction activities when conducted as part of an approved Building Permit, except as prohibited in Subsection 17.58.050(E)(1) (Prohibited Activities) below.

17.58.050 E. PROHIBITED ACTIVITIES

1. Construction Noise. Operating or causing the operation of tools or equipment on private property used in alteration, construction, demolition, drilling, or repair work daily between the hours of 7:00 p.m. and 7:00 a.m., so that the sound creates a noise disturbance across a residential property line, except for emergency work of public service utilities.

VIBRATION STANDARDS

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that in that noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of an amplitude and frequency. A person's perception

to the vibration will depend on their individual sensitivity to vibration, as well as the amplitude and frequency of the source and the response of the system which is vibrating.

Vibration can be measured in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities in inches per second. Standards pertaining to perception as well as damage to structures have been developed for vibration levels defined in terms of peak particle velocities.

The City of Manteca does not have specific policies pertaining to vibration levels. However, vibration levels associated with construction activities and railroad operations are addressed as potential noise impacts associated with project implementation.

Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. Table 3.11-6 indicates that the threshold for damage to structures ranges from 2 to 6 peak particle velocity in inches per second (in/sec p.p.v). One-half this minimum threshold or 1 in/sec p.p.v. is considered a safe criterion that would protect against architectural or structural damage. The general threshold at which human annoyance could occur is noted as 0.1 in/sec p.p.v.

TABLE 3.11-6: EFFECTS OF VIBRATION ON PEOPLE AND BUILDINGS

PEAK PARTICLE VELOCITY		*HUMAN REACTION*	*EFFECT ON BUILDINGS*
MM/SEC.	*IN./SEC.*		
0.15-0.30	0.006-0.019	Threshold of perception; possibility of intrusion	Vibrations unlikely to cause damage of any type
2.0	0.08	Vibrations readily perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
2.5	0.10	Level at which continuous vibrations begin to annoy people	Virtually no risk of “architectural” damage to normal buildings
5.0	0.20	Vibrations annoying to people in buildings (this agrees with the levels established for people standing on bridges and subjected to relative short periods of vibrations)	Threshold at which there is a risk of “architectural” damage to normal dwelling - houses with plastered walls and ceilings. Special types of finish such as lining of walls, flexible ceiling treatment, etc., would minimize “architectural” damage
10-15	0.4-0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause “architectural” damage and possibly minor structural damage.

SOURCE: CALTRANS. TRANSPORTATION RELATED EARTHBORN VIBRATIONS. TAV-02-01-R9601 FEBRUARY 20, 2002.

3.11.3 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the Project will have a significant impact related to noise if it will result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- A substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project;
- A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without Project;
- For a Project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the Project area to excessive noise levels within two miles of a public airport or public use airport; or
- For a Project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

The Project site is not located within two miles of a public or private airport or airstrip. Therefore, airport and airport noise is not discussed further in this analysis.

Determination of a Significant Increase in Noise Levels

California Environmental Quality Act (CEQA) guidelines define a significant impact of a project if it "increases substantially the ambient noise levels for adjoining areas". The City of Manteca General Plan Noise Element Implementation Measure N-I-3 provides specific guidance for assessing increases in ambient noise, as follows:

> *In making a determination of impact under the California Environmental Quality Act (CEQA), a substantial increase will occur if ambient noise levels are increased by 10 dB or more. An increase from 5-10 dB may be substantial. Factors to be considered in determining the significance of increases from 5-10 dB include:*
>
> - *the resulting noise levels*
> - *the duration and frequency of the noise*
> - *the number of people affected*
> - *the land use designation of the affected receptor sites*
> - *public reactions/controversy as demonstrated at workshops/hearings, or by correspondence*
> - *prior CEQA determinations by other agencies specific to the project*

- *The proposed project is not located within two miles of an airport. Therefore, aircraft noise is not examined further in this report.*

IMPACTS AND MITIGATION MEASURES

Impact 3.11-1: The proposed Project has the potential to increase traffic noise levels at existing receptors. (Less than Significant)

PROPOSED PROJECT ANALYSIS

Table 3.11-7 shows the predicted traffic noise level increases on the local roadway network for Existing No Project, Existing + Project, Cumulative, and Cumulative No Project conditions. Appendix B of Appendix D provides the complete inputs and results of the FHWA traffic noise modeling.

TABLE 3.11-7: EXISTING AND CUMULATIVE TRAFFIC NOISE LEVELS

ROADWAY	SEGMENT	NOISE LEVELS (L_{DN}, dB) AT NEAREST SENSITIVE RECEPTORS					
		EXISTING	EXISTING + PROJECT	CHANGE	CUMULATIVE	CUMULATIVE + PROJECT	CHANGE
Airport Way	N. of Yosemite Ave.	65.6	65.7	0.1	68.3	68.4	0.1
Airport Way	Yosemite Ave. to Daniels St.	67.9	68.0	0.1	69.9	70.0	0.1
Airport Way	Atherton Dr. to Woodward Ave.	62.6	64.7	2.1	65.5	66.0	0.5
Airport Way	S. of Woodward Ave.	58.4	58.5	0.1	61.7	61.7	0.0
McKinley Ave.	Yosemite Ave. to Bronzan Rd.	62.8	68.2	5.3	68.3	68.6	0.3
Union Rd.	N. of SR 120	63.9	64.1	0.2	65.7	65.7	0.1
Union Rd.	Atherton Dr. to Woodward Ave.	54.6	55.4	0.8	59.1	59.3	0.2
Union Rd.	South of Woodward Ave.	59.9	60.0	0.1	63.8	63.8	0.0
Woodward Ave.	W. of McKinley Ave.	46.3	50.1	3.7	46.6	50.2	3.5
Woodward Ave.	McKinley Ave.to Airport Way	55.6	59.7	4.1	61.1	61.9	0.8
Woodward Ave.	Airport Way to Union Rd.	60.1	62.7	2.6	63.6	64.6	1.0
Woodward Ave.	E. of Union Rd.	60.4	60.6	0.3	62.8	62.8	0.0
Yosemite Ave.	W. of McKinley Ave.	60.1	62.4	2.4	61.5	61.5	0.0
Yosemite Ave.	McKinley Ave.to Airport Way	61.9	62.1	0.2	64.1	64.3	0.1
Yosemite Ave.	Airport Way to Union Rd.	67.8	67.9	0.1	69.3	69.4	0.1

SOURCE: J.C. BRENNAN & ASSOCIATES, INC., 2016.

Some noise sensitive receptors located along the Project-area roadways are currently exposed to exterior traffic noise levels exceeding the City of Manteca 60 dB L_{dn} exterior noise level standard for residential uses, as shown in Table 3.11-7. As shown by Table 3.11-7, these receptors will continue to experience elevated exterior noise levels with implementation of the proposed Project. The proposed Project's contribution to traffic noise increases is predicted to be 5.3 dBA L_{dn}, or less. This complies with the City's substantial increase criteria of 5 to 10 dB.

CONCLUSION

The proposed Project would not cause increased noise levels exceeding the City of Manteca 60 dB L_{dn} exterior noise level standard at existing residential receptors. Additionally, traffic noise level increases would not exceed the City's CEQA substantial increase criteria of 5 to 10 dB. Therefore, impacts associated with increased traffic noise levels at existing receptors would be **less than significant**.

Impact 3.11-2: The proposed Project has the potential to increase noise levels associated with construction activities. (Less than Significant with Mitigation)

During the construction of the Project, including roads, water, and sewer lines and related infrastructure, noise from construction activities would add to the noise environment in the Project vicinity. Activities involved in construction would generate maximum noise levels, as indicated in Table 3.11-8, ranging from 76 to 90 dB at a distance of 50 feet. Construction activities would be temporary in nature and are anticipated to occur during normal daytime working hours.

TABLE 3.11-8: CONSTRUCTION EQUIPMENT NOISE

TYPE OF EQUIPMENT	*MAXIMUM LEVEL, DB, AT 50 FEET*
Backhoe	78
Compactor	83
Compressor (air)	78
Concrete Saw	90
Dozer	82
Dump Truck	76
Excavator	81
Generator	81
Jackhammer	89
Pneumatic Tools	85

SOURCE: ROADWAY CONSTRUCTION NOISE MODEL USER'S GUIDE. FEDERAL HIGHWAY ADMINISTRATION. FHWA-HEP-05-054. JANUARY 2006.

Noise would also be generated during the construction phase by increased truck traffic on area roadways. A significant Project-generated noise source would be truck traffic associated with transport of heavy materials and equipment to and from construction sites. This noise increase would be of short duration, and would likely occur primarily during daytime hours.

Construction activities would be temporary in nature and are exempt from noise regulation during the hours of 7:00 AM to 7:00 PM, as outlined in the City's Municipal Code:

> **17.58.050 D. Exempt Activities**
>
> 8. Construction activities when conducted as part of an approved Building Permit, except as prohibited in Subsection 17.58.050(E)(1) (Prohibited Activities) below.
>
> **17.58.050 E. Prohibited Activities**
>
> 1. Construction Noise. Operating or causing the operation of tools or equipment on private property used in alteration, construction, demolition, drilling, or repair work daily between the hours of 7:00 p.m. and 7:00 a.m., so that the sound creates a noise disturbance across a residential property line, except for emergency work of public service utilities.

Implementation of the following mitigation measures will ensure that these potential impacts are reduced to a **less-than-significant** level.

MITIGATION MEASURE(S)

Mitigation Measure 3.11-1: *Construction activities shall adhere to the requirements of the City of Manteca Municipal Code with respect to hours of operation. This requirement shall be noted in the improvements plans prior to approval by the City's Public Works Department.*

Mitigation Measure 3.11-2: *All equipment shall be fitted with factory equipped mufflers, and in good working order. This requirement shall be noted in the improvements plans prior to approval by the City's Public Works Department.*

Impact 3.11-3: The proposed Project has the potential to increase noise vibration association with construction activities. (Less than Significant)

The primary vibration-generating activities associated with the proposed Project would occur during construction when activities such as grading, utilities placement, and parking lot construction occur. Sensitive receptors which could be impacted by construction-related vibrations, especially vibratory compactors/rollers, are located approximately 100 feet or further from the Project site. At this distance, construction vibrations are not predicted to exceed acceptable levels. Additionally, construction activities would be temporary in nature and would likely occur during normal daytime working hours.

Construction vibration impacts include human annoyance and building structural damage. Human annoyance occurs when construction vibration rises significantly above the threshold of perception. Building damage can take the form of cosmetic or structural. Table 3.11-9 shows the typical vibration levels produced by construction equipment.

Table 3.11-9 data indicate that construction vibration levels anticipated for the Project are less than the 0.1 in/sec criteria at distances of 50 feet. Therefore, construction vibrations are not predicted to cause damage to existing buildings or cause annoyance to sensitive receptors. Implementation of the proposed Project would have a **less than significant** impact relative to this environmental topic.

TABLE 3.11-9: VIBRATION LEVELS FOR VARYING CONSTRUCTION EQUIPMENT

TYPE OF EQUIPMENT	*PEAK PARTICLE VELOCITY @ 25 FEET (INCHES/SECOND)*	*PEAK PARTICLE VELOCITY @ 100 FEET (INCHES/SECOND)*
Large Bulldozer	0.089	0.011
Loaded Trucks	0.076	0.010
Small Bulldozer	0.003	0.000
Auger/drill Rigs	0.089	0.011
Jackhammer	0.035	0.004
Vibratory Hammer	0.070	0.009
Vibratory Compactor/roller	0.210	0.026

SOURCE: FEDERAL TRANSIT ADMINISTRATION, TRANSIT NOISE AND VIBRATION IMPACT ASSESSMENT GUIDELINES, MAY 2006.

Impact 3.11-4: The proposed Project has the potential to expose new sensitive receptors to excessive transportation noise. (Less than Significant with Mitigation)

The FHWA traffic noise prediction model was used to predict Cumulative + Project traffic noise levels at the proposed residential land uses associated with the Project. Table 3.11-10 shows the predicted traffic noise levels at the proposed residential uses adjacent to the major Project-area arterial roadways. Table 3.11-10 also indicates the property line noise barrier heights required to achieve compliance with an exterior noise level standard of 60 dB L_{dn}.

TABLE 3.11-10: CUMULATIVE + PROJECT TRANSPORTATION NOISE LEVELS AT PROPOSED RESIDENTIAL USES

ROADWAY	*APPROXIMATE RESIDENTIAL SETBACK, FEET*[1]	*ADT*	*PREDICTED TRAFFIC NOISE LEVELS, DB L_{DN}*[2]					
			NO WALL	*6' WALL*	*7' WALL*	*8' WALL*	*9' WALL*	*10' WALL*
SR 120 - Residential east of McKinley along Atherton	400'	130,200	72	67	66	64	63	62
Atherton - Residential west of McKinley	65'	21,660	69	63	61	60	59	58
McKinley - Residential south of Atherton	65'	16,190	68	62	60	59	58	57
Woodward - Residential west of McKinley	65'	6,990	64	58	57	55	54	53

NOTES: ADT = AVERAGE DAILY TRIPS

[1] SETBACK DISTANCES ARE MEASURED IN FEET FROM THE CENTERLINES OF THE ROADWAYS TO THE CENTER OF RESIDENTIAL BACKYARDS.

[2] THE MODELED NOISE BARRIERS ASSUME FLAT SITE CONDITIONS WHERE ROADWAY ELEVATIONS, BASE OF WALL ELEVATIONS, AND BUILDING PAD ELEVATIONS ARE APPROXIMATELY EQUIVALENT.

SOURCE: FHWA-RD-77-108 WITH INPUTS FROM FEHR & PEERS, AND J.C. BRENNAN & ASSOCIATES, INC., 2016.

The complete inputs and results to the FHWA traffic noise prediction model and barrier calculations are contained in the Noise Study Appendix C (see Appendix D of this EIR). The modeled noise barriers assume flat site conditions where roadway elevations, base of wall elevations, and building pad elevations are approximately equivalent.

To describe future noise levels due to traffic, the FHWA Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used. Direct inputs to the model included traffic volumes provided by Fehr & Peers. The FHWA model is based upon the Calveno reference noise factors for automobiles, medium trucks and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The FHWA model was developed to predict hourly L_{eq} values for free-flowing traffic conditions. To predict L_{dn}/CNEL values, it is necessary to determine the day/night distribution of traffic and adjust the traffic volume input data to yield an equivalent hourly traffic volume.

Table 3.11-10 data indicate that noise barriers six- to eight-feet in height would generally be sufficient to achieve compliance with the City of Manteca 60 dB L_{dn} exterior noise level standard for the proposed residential uses. However, for the residential uses located at the northeast corner of the project site, sound walls of eight- to ten-feet in height would only reduce exterior noise levels to 62 to 64 dB L_{dn}. While these noise level do not meet the City's preferred 60 dB L_{dn} noise standards, they would comply with the City's conditionally acceptable standard of 65 dB L_{dn} where practical noise control measures cannot achieve 60 dB L_{dn}. Generally, sound walls exceeding 10-feet in height are not desirable in close proximity to residential uses.

INTERIOR NOISE IMPACTS

Modern construction typically provides a 25 dB exterior-to-interior noise level reduction with windows closed. Therefore, sensitive receptors exposed to exterior noise of 70 dB L_{dn}, or less, will typically comply with the City of Manteca 45 dB L_{dn} interior noise level standard. Additional noise reduction measures, such as acoustically-rated windows, are generally required for exterior noise levels exceeding 70 dB L_{dn}.

It should be noted that exterior noise levels are typically two to three dB higher at second floor locations. Additionally, noise barriers do not reduce exterior noise levels at second floor locations. The proposed residential uses are predicted to be exposed to unmitigated first floor exterior transportation noise levels ranging between 64 to 72 dB L_{dn}. Therefore, second floor facades are predicted to be exposed to exterior noise levels of up to 66 to 75 dB L_{dn}.

Based upon a 25 dB exterior-to-interior noise level reduction, interior noise levels are predicted to range between 41 to 50 dB L_{dn}. Predicted interior noise levels would exceed the City's 45 dB L_{dn} interior noise level standard at the first row of residential uses located closest to SR-120, along Atherton Drive. Therefore, additional interior noise control measures would be required for these residential uses. In order to reduce interior noise levels to 45 dB L_{dn}, or less, it is likely that second floor facades would require windows having a Sound Transmission Class (STC) 36, or higher.

Exterior walls would also likely require three-coat stucco and RC-channels. This would specifically apply to the first row of homes along Atherton Drive, within 800-feet of the centerline of SR-120 and would not apply to facades facing away from the roadway.

This analysis assumes that mechanical ventilation will be provided to allow residents to keep doors and windows closed, as desired for acoustical isolation. With implementation of the following interior and exterior mitigation measures, the proposed Project would have a **less-than-significant** impact relative to this environmental topic.

MITIGATION MEASURE(S)

Mitigation Measure 3.11-3: *Minimum 6- to 10-foot tall sound walls and/or landscaped berms shall be constructed along the primary Project-area roadways, adjacent to proposed residential uses, in order to achieve the City's exterior noise standards. See Table 3.11-10 of Section 3.11 of the Draft EIR for specific noise barrier heights along each roadway, summarized below:*

- *Atherton - Residential east of McKinley to Dutch Harbor: 8-foot wall*
- *Atherton - Residential east of Dutch Harbor to eastern Project boundary: 10-foot wall*
- *Atherton - Residential west of McKinley: 8-foot wall*
- *McKinley - Residential south of Atherton: 7-foot wall*
- *Woodward - Residential west of McKinley: 6-foot wall*

Noise barrier walls shall be constructed of concrete masonry units, earthen berms, or any combination of these materials. Wood is not recommended due to eventual warping and degradation of acoustical performance. These requirements shall be included in the improvements plans prior to their approval by the City's Public Works Department.

Mitigation Measure 3.11-4: *The first row of residential uses located along SR-120 shall include windows having a Sound Transmission Class (STC) 36, or higher, rating installed in second floor facades. Exterior walls would also likely require 3-coat stucco and RC-channels. This would specifically apply to the first row of homes along Atherton Drive, within 800-feet of the centerline of SR-120 and does not apply to facades facing away from the roadway. A detailed analysis of any additional interior mitigation measures shall be conducted when building plans are available to verify these requirements. This requirement shall be included in the Improvement Plans for approval by the Building Department prior to the issuance of building permits for the homes in this area.*

Mitigation Measure 3.11-5: *Mechanical ventilation shall be installed in all residential uses to allow residents to keep doors and windows closed, as desired for acoustical isolation. This requirement shall be included in the Improvement Plans for approval by the Building Department prior to the issuance of building permits.*

Impact 3.11-5: The proposed Project has the potential to expose sensitive receptors to substantial noise from proposed park uses. (Less than Significant with Mitigation)

Children playing at neighborhood parks or outdoor recreational fields (softball, soccer, basketball, tennis) are often considered potentially significant noise sources which could adversely affect adjacent noise-sensitive land uses. Typical noise levels associated with groups of approximately 50 children playing at a distance of 50 feet generally range from 55 to 60 dB L_{eq} and 70 to 75 dB L_{max}. It is expected that park activities would occur during daytime hours. Therefore, noise levels from the playgrounds would need to comply with the City of Manteca exterior noise level standards of 50 dB L_{eq} and 70 dB L_{max} at the nearest residential uses.

Based upon the reference noise level data discussed above, the 50 dB L_{eq} noise contour would be located approximately 160 feet from the center of playgrounds or recreational fields. The 70 dB L_{max} noise contour would extend approximately 90 feet from the center of playground or recreational fields. For residential backyards located less than 160 feet from the center of a playground or recreational field, noise levels may exceed the City of Manteca 50 dB L_{eq} exterior noise level standard. In this case, construction of a six-foot tall masonry sound wall would provide an approximate noise level reduction of 5 dB and would typically reduce noise levels to 50 dB L_{eq} and 70 dB L_{max}, or less.

With implementation of the following mitigation measure, the proposed Project would have a **less than significant** impact relative to this environmental topic.

MITIGATION MEASURE(S)

Mitigation Measure 3.11-6: *Minimum 6-foot tall sound walls and/or landscaped berms shall be constructed where a park site abuts a residential use. No wall shall be required where residential uses are fronted towards a park site and separated by a roadway. Noise barrier walls shall be constructed of concrete masonry units, earthen berms, or any combination of these materials. Wood is not recommended due to eventual warping and degradation of acoustical performance. This requirement shall be included in the Improvement Plans for approval by the Building Department prior to the issuance of building permits.*

Impact 3.11-6: The proposed Project has the potential to expose sensitive receptors to substantial noise from proposed commercial mixed-uses. (Less than Significant with Mitigation)

COMMERCIAL AND OFFICE LAND USES

Commercial and office land use activities can produce noise levels which affect adjacent sensitive land uses. These noise sources can be continuous and may contain tonal components which may be annoying to individuals who live in the nearby vicinity. In addition, noise generation from fixed noise sources may vary based upon climatic conditions, time of day, and existing ambient noise

levels. The primary noise sources generally include truck deliveries, trash pickup, parking lot use, and heating, ventilation, and air conditioning (HVAC) equipment operation. These sources may result in noise levels in excess of the City's standards at nearby receptors.

MECHANICAL EQUIPMENT

HVAC equipment can be a primary noise source associated with commercial mixed uses. These types of equipment are often mounted on roof tops, located on the ground, or located within mechanical rooms. The noise sources can take the form of fans, pumps, air compressors, chillers, or cooling towers. Noise levels from these types of equipment can vary significantly. Noise levels from these types of sources generally range between 45 dB to 70 dB at a distance of 50 feet and could exceed City standards at nearby receptors.

MEASURES TO REDUCE NOISE EXPOSURE

Use of Setbacks: Noise exposure may be reduced by increasing the distance between the noise source and receiving use. Setbacks can take the form of open space, frontage roads, recreational areas, etc. The available noise attenuation from this technique is limited by the characteristics of the noise source, but is generally 3 to 6 dB per doubling of distance from the source. The rule-of-thumb is that most traffic and railroad noise levels will decrease or increase by approximately 4.5 dB per doubling, or halving of distance, respectively. Noise from point sources, such as HVAC equipment, will generally attenuate at 6 dB per doubling of distance.

Use of Barriers: Noise reduction can be accomplished by placing walls, berms, or other structures, such as buildings, between the noise source and the receiver. In addition, intervening topography can be an effective barrier for noise control. The effectiveness of a barrier depends upon blocking line-of-sight between the source and receiver, and is improved with increases in distance the sound must travel to pass over the barrier as compared to a straight line from source to receiver. The difference between the distance over a barrier and a straight line between source and receiver is called the "path length difference," and is the basis for calculating barrier noise reduction.

In general, barriers are most effective when placed close to either the receiver or the source. An intermediate barrier location yields a smaller path length difference for a given increase in barrier height than does a location closer to either source or receiver.

Site Design, Building Locations, and Building Orientations: Buildings can be placed on a project site to shield other structures or areas, to remove them from noise-impacted areas, and to prevent an increase in noise levels caused by reflections. As an example, carports or garages can be used to form or complement a barrier, or shield an outdoor activity area. Placement of outdoor activity areas on the opposite side of the building facades from the noise source, or within the shielded portion of a building complex, such as a central courtyard, can also be an effective method of providing a quiet retreat in an otherwise noisy environment.

CONCLUSION

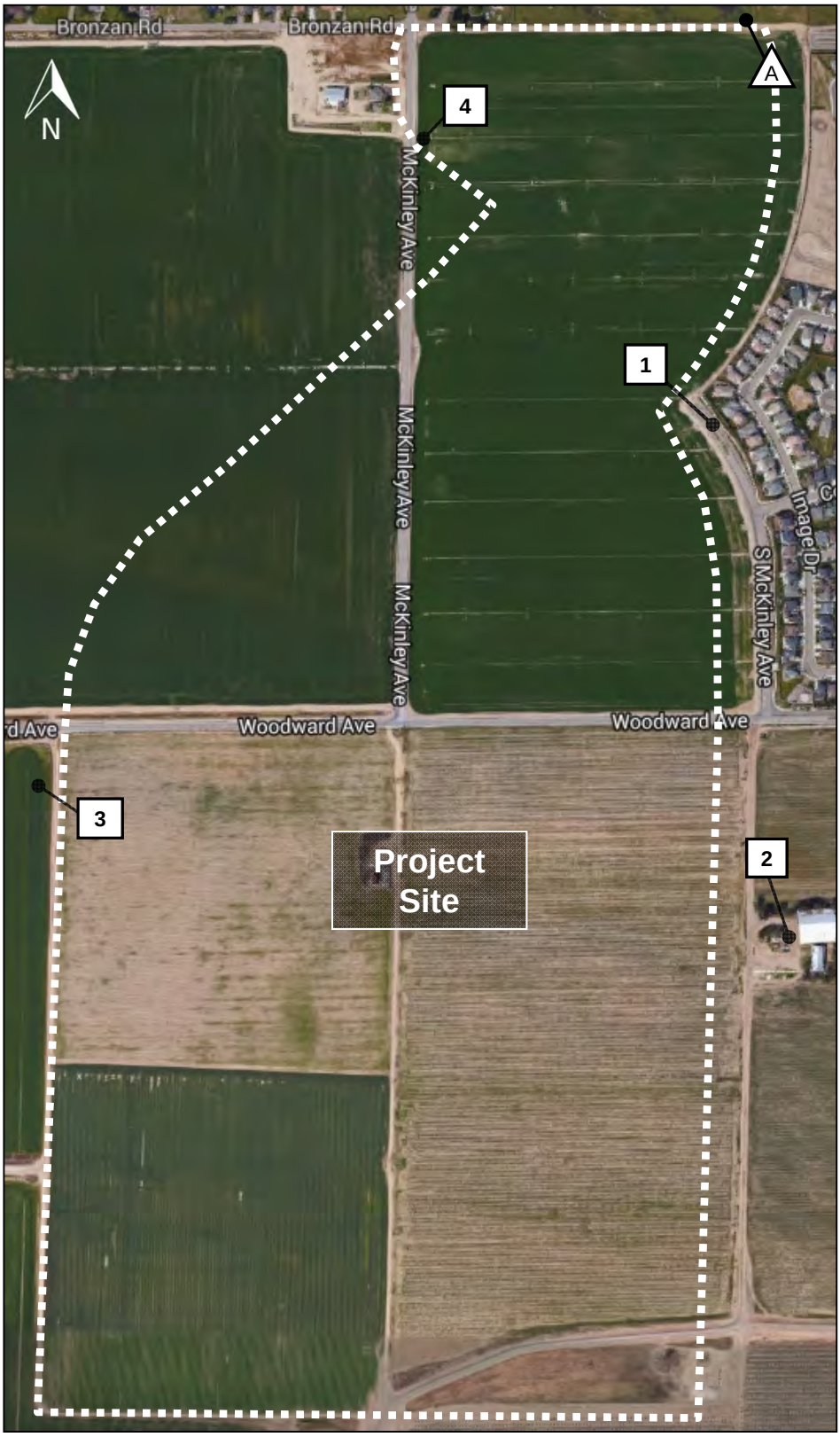
With implementation of the following mitigation measure, the proposed Project would have a **less than significant** impact relative to this environmental topic.

MITIGATION MEASURE(S)

Mitigation Measure 3.11-7: *Where commercial, business professional, office, or similar uses abut residential uses or where loading docks or truck circulation routes face residential areas, the following mitigation measures shall be included in the Project design:*

- *All HVAC equipment shall be located within mechanical rooms where possible or shielded from view with solid barriers;*
- *Emergency generators shall comply with the City's noise criteria at the nearest noise-sensitive receivers;*
- *Delivery/loading activities shall comply with the City of Manteca noise ordinance standards; and*
- *The applicant shall submit a noise study to verify that the appropriate noise control measures have been incorporated into the Project design and will achieve compliance with the City's noise level standards.*

These requirements shall be included in the Improvement Plans for approval by the Building Department and Planning Division prior to the issuance of building permits.



Legend

X : Continuous (24-hr) Noise Measurement Site

:Short-Term Noise Measurement Site

Oakwood Landing
Figure 3.11-1
Noise Measurement Locations

j.c. brennan & associates
consultants in acoustics

Figure Prepared:
December 6, 2016

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This section describes and evaluates potential impacts associated with the provision of police protection, fire protection and emergency services, parks and recreation, schools, and other public facilities for the proposed Project. The information in this section is primarily derived from the *City of Manteca General Plan* (City of Manteca, City of Manteca, as amended through 2016), *City of Manteca General Plan Environmental Impact Report* (City of Manteca, 2003), *Draft Manteca Draft Municipal Services Review and Sphere of Influence Plan* (City of Manteca, 2014). One comment was received from the Manteca Unified School District during the NOP comment period regarding public services. Full comments received are included in Appendix A.

3.12.1 ENVIRONMENTAL SETTING

CITY OF MANTECA SERVICES

The City of Manteca receives funds for the provision of public services through development fees, property taxes, and connection and usage fees. As land is developed within the City and annexed into the City of Manteca, these fees apply. The City of Manteca reviews these fee structures on an annual basis to ensure that they provide adequate financing to cover the provision of city services. The City's Community Development, Public Works, and Finance Departments are responsible for continual oversight to ensure that the fee structures are adequate. The City reviews the referenced fees and user charges on an annual basis to determine the correct level of adjustment required to reverse any deficits and assure funding for needed infrastructure going forward. The City intends to include discussion of these fees and charges as part of the annual budget hearings.

City of Manteca Police Department

Police protection services in the City of Manteca are provided by the Manteca Police Department (MPD). The MPD operates out of its headquarters located at 1001 W. Center Street**.** Currently the MPD has 63 sworn officers.

The MPD classifies calls for service as priority 1, priority 2 or priority 3. Priority 1 calls are calls where a threat is posed to life or a crime of violence. Priority 2 calls are calls for service where there is an urgency or suspicious behavior. Priority 3 calls are for service where no emergency or serious problem is involved. The average response times by priority call for 2012 and 2013 are listed below.

- Priority 1 calls: 2012, 4 minutes and 16 seconds. 2013, 4 minutes and 46 seconds.
- Priority 2 calls: 2012, 18 minutes and 39 seconds. 2013, 17 minutes and 54 seconds.
- Priority 3 calls: 2012, 37 minutes and 17 seconds. 2013, 37 minutes and 49 seconds.

ORGANIZATION

The MPD is organized into two divisions: Operations and Services. Additionally, the MPD operates a Public Affairs Unit. For budgeting purposes, the MPD is organized into the following programs: administration, patrol, investigations, support services, dispatch, code enforcement, jail services, and animal services.

Operations Division
The Operations Division is the largest division of the Department. It includes all uniformed officers and their support teams. The units included in the Operations Division are patrol, traffic, community service officers, SWAT, crisis response team, mounted patrol, canine, and bomb squad.

Services Division
The Services Division includes all the teams and units that support the line police function of the MPD. These teams include Dispatch, Records, Property and Evidence, Crime Analysis, and Animal Services, as well as Detectives, School Resource Officers, Gang Unit, and Manteca's Street Crimes Unit (SCU), which is the department's proactive narcotic and street crime suppression unit.

The MPD also has several very active volunteer groups. The Police Explorers, Citizen's Police Academy graduates, Police Reserves, and the SHARPs allow members of the community of all ages and experience to give back to the community through volunteering.

Public Affairs Unit
The MPD's Public Affairs Officer (PAO) works directly with the Chief of Police on issues that affect the MPD and community. In addition to being a community liaison, the PAO works with the public in providing current information regarding issues effecting Manteca. This is done by working with local news media outlets, issuing information bulletins and conducting neighborhood meetings, and by using the local government channel for a program called StreetBeat. In addition to assisting the Chief of Police, the PAO also coordinates several crime prevention programs to include the Citizen Police Academy, Drug Awareness Education, and various workplace-training programs such as Workplace Violence Prevention. The PAO also coordinates with other city offices special projects and does site plan reviews for new commercial and residential projects using a process called CPTED (Crime Prevention Through Environmental Design). Table 3.12-1 shows the recent crime statistics for the City of Manteca between 2013 and 2015.

TABLE 3.12-1: MANTECA POLICE DEPARTMENT CRIME STATISTICS (2013-2015)

CATEGORY/CRIME	*2013*	*2014*	*2015*
Total Violent Crimes	212	176	213
Homicide	0	4	5
Rape	4	7	10
Robbery	79	73	82
Assault	129	92	116
Total Property Crimes	2,699	2,100	2,449
Burglary	489	314	420
Motor Vehicle Theft	327	346	405
Larceny	1,883	1,440	1,624
Arson	22	16	20

SOURCE: FBI CRIME STATISTICS; HTTPS://UCR.FBI.GOV/.

City of Manteca Fire Department

The Manteca Fire Department is responsible for the primary provision of fire service and emergency medical response for the City of Manteca and its residents. The Manteca Fire

Department serves approximately 71,164 residents throughout approximately 17.2 square miles within the City limits. The Manteca Fire Department operates out of four (4) facilities that are strategically located in the City of Manteca. The Manteca Fire Department is headquartered in Station 242 located at 1154 S. Union Road. This building serves as the Fire Department headquarters and the Fire Prevention Bureau. Fire training and emergency medical services are managed out of Station 241. Apparatus includes four engines, four reserve engines, one ladder truck, one medium rescue unit, one USAR rescue trailer, eight staff vehicles, two pick-up trucks, and a public education trailer.

The Manteca Fire Department maintains a goal for the initial company of three (3) firefighters to arrive on scene for fire and emergency medical service (EMS) incidents within five (5) minutes 90% of the time (Response Effectiveness). In 2014, the Department averaged a 4:18 response time City-wide and was on scene within five minutes 77% of the time. In 2015, the Department averaged a 4:40 response time City-wide. Additionally, in 2015, 6,615 calls were made to the Department, which is the greatest number of calls in the history of the Manteca Fire Department.[1]

The Department is not currently meeting the Response Effectiveness goal. In May of 2016, the Department arrived on-scene within 5 minutes approximately 66% of the time.[2] The percentage continues to decline. The Department has recently seen increased calls and expanded areas of coverage. The proposed Project will be served by the Department's most impacted fire station (Station No. 2, 1154 S. Union Rd). To combat the increased calls in the southern areas of Manteca, the Department has recently staffed a "Rescue" in District 2. The additional unit will help relieve the significant call volume in south Manteca.

On September 11, 2013, Fire Station No. 4 opened in northwest Manteca. Fire Station No. 4 was one factor that helped to improve both the average response time and the percent of response effectiveness in 2014.

The construction of Fire Station No. 5, which is planned in southeast Manteca, will have a similar impact on response times and response effectiveness. The City is in the process of completing 30 percent of the design of this station with the intent of constructing and staffing this station by the 2019/2020 fiscal year. Funding for this station is dependent on additional annexations and development in the area. The construction and staffing of Fire Station No. 5 will allow the City the ability to achieve the full alarm standard outlined by NFPA 1710 for the first time in the City's History; this will directly affect the ISO rating, enhance service to the citizens of Manteca, and improve the department's ability to obtain grants.

[1] City of Manteca Fire Department. 2015. City of Manteca Fire Department 2015 Annual Report.

[2] Personal Communication with Lantz Rey, City of Manteca Fire Department Fire Marshal. July 19, 2016.

ISO RATING

The Insurance Services Office (ISO) Public Protection Classification Program currently rates the Fire Department as THREE on a scale of 1 to 10, with 1 being the highest possible protection rating and 10 being the lowest. The ISO rating measures individual fire protection agencies against a Fire Suppression Rating Schedule, which includes such criteria as facilities and support for handling and dispatching fire alarms, first-alarm response and initial attack, and adequacy of local water supply for fire-suppression purposes. The recent construction and staffing of Fire Station No. 4 as well as the imminent construction and staffing of Fire Station No. 5 will have a positive impact on the City's ISO rating. The ISO ratings are used to establish fire insurance premiums. The City is in the process of completing 30 percent of the design of Station No. 5 with the intent of constructing and staffing this station by the 2019/2020 fiscal year. The City plans to apply for ISO re-classification when Fire Station No. 5 is complete. In addition, upon completion the Fire Department will apply for Accreditation through the Commission of Fire Accreditation International (CFAI).

City of Manteca Parks and Recreation Department

Manteca is home to more than 50 public park spaces totaling more than 400 acres. Parks and Recreation amenities include several baseball and softball diamonds, sports fields, picnic areas, barbecues, playgrounds and tot lots, a 3+ mile Class 1 bike and pedestrian path, lighted tennis courts, a BMX bicycle track, a skate park, an 18-hole municipal golf course, and a public swimming pool (with tot pool). Existing rental facilities include:

- Northgate: Full Picnic Shelter; Half Picnic Shelter
- Lincoln Picnic Shelter
- Woodward: Full Picnic Shelter; Half Picnic Shelter
- Library Park Gazebo
- Lincoln Pool
- Sports Fields

On a regional scale, the City is located in the Sacramento-San Joaquin Delta (Delta), which contains several recreational areas and facilities, primarily for water-based recreation. Regional County parks near the City include the 9.85-acre Dos Reis Regional Park and the 3.7-acre Mossdale Crossing Regional Park, both located along the San Joaquin River. Mossdale Crossing Park is located near the Project site on the west side of Interstate 5. Each of these parks includes boat launch ramps, picnic/barbeque areas, and children's play areas. Dos Reis Regional Park also has camping facilities. Also in the vicinity is the Haven Acres Marina, a private marina located on the San Joaquin River north of Dos Reis Regional Park. This facility provides river access to the San Joaquin River and includes parking areas, a boat ramp, and 10 boat berths.

The City currently has over 400 acres of developed parkland. Based on the Department of Finance estimated 2015 population of 73,787, the City more than meets its General Plan parkland goal of five acres per 1,000 residents. See Tables 3.12-2 and 3.12-3 for an inventory of the existing community/specialty park and neighborhood park facilities, respectively.

TABLE 3.12-2: COMMUNITY/SPECIALTY PARK FACILITIES INVENTORY

NAME	*ADDRESS*	*ACRES*	*AMENITIES*
Big League Dreams Sport Park	1077 Milo Candini Dr.	37.91	Picnic tables, play equipment, restrooms, 6 lighted ballfields, indoor soccer field
BMX Track	941 Spreckels Ave.	6.70	1,200-foot long ABA BMX track
Center St. Tennis Courts	311 W. Center St.	0.46	Picnic tables, 2 tennis courts (no lights)
Civic Center	1001 W. Center St,	5.87	Picnic tables, restrooms, Parks & Recreation offices, classrooms
Library Park	320 W. Center St.	1.25	Picnic tables, play equipment, restrooms, gazebo, interactive water feature, bocce ball court, murals
Lincoln Park & Pool	245 S. Powers Ave.	3.71	Picnic tables, barbecues, play equipment, tot lot, baseball backstop, restrooms, swimming pool, lighted ballfield
Manteca Park Golf Course	305 N. Union Rd.	101.00	Restrooms, 18-hole course, driving range, snack bar, banquet facilities, pro shop
Morenzone Ballfield	1323 W. Center St.	3.30	Picnic tables, baseball backstop, restrooms, lighted ballfield
Northgate Park	1750 Hoyt Ln.	15.11	Picnic tables, barbecues, play equipment, tot lot, baseball backstop, restrooms, sports field, softball complex (3 lighted fields), horseshoe pit, sand volleyball
Senior Center	295 Cherry Ln.	--	Picnic tables, restrooms, auditorium with stage, kitchen, craft room
Skate Park	Center St. and Elm Ave.	0.32	Small and large bowls, quarter pipes
Spreckels Recreation Park	941 Spreckels Ave.	3.27	Sports field turf area
Tidewater Bikeway	Lathrop Rd. to Moffat Blvd.	34.00	3.4-mile Class I bike & pedestrian path
Union Road Tennis Park	307 N. Union Rd.	7.73	Picnic tables, 6 lighted tennis courts
Union Road Park	245 N. Union Rd.	1.40	Baseball diamond
Wilson Park	224 W. Center St.	0.37	Picnic tables
Woodward Park	710 E. Woodward Ave.	50.62	Picnic tables, barbecues, play equipment, tot lot, basketball, restrooms, sports fields

SOURCE: CITY OF MANTECA PARKS AND RECREATION DEPARTMENT WEBSITE, HTTP://WWW.CI.MANTECA.CA.US/PARKS/FACILITIES/DEFAULT.HTM

TABLE 3.12-3: NEIGHBORHOOD PARK FACILITIES INVENTORY

NAME	*ADDRESS*	*ACRES*	*AMENITIES*
Antigua Park	1055 Collins Ave.	5.08	Picnic tables, barbecues, play equipment, tot lot, basketball
Baccilieri Park	154 Stockton St.	1.26	Picnic tables, baseball backstop
Bella Vista Park	1580 Bella Terra Dr.	9.24	Picnic tables, barbecues, play equipment, tot lot
B & C Giles Memoral Park	545 W. Alameda St.	4.00	Picnic tables, barbecues, play equipment
Button Estates Park	1457 Discovery Creek Dr.	3.70	Baseball backstop
Chadwick Square Park	1953 London Ave.	9.00	Picnic tables, play equipment, tot lot
Colony Park	1232 Trailwood Ave.	5.03	Picnic tables, barbecues, play equipment, tot lot, basketball
Cotta Park	505 Mission Ridge Dr.	3.70	Open field
Crestwood Park	1901 Crestwood Ave.	3.85	Picnic tables, play equipment, basketball
Curran Grove Park	196 Berndt Ave.	4.50	Picnic tables, barbecues, play equipment, tot lot, baseball backstop
Diamond Oaks Park	1179 Pestana Ave.	6.46	Picnic tables, barbecues, play equipment, tot lot, basketball, baseball backstop
Doxey Park	1355 Northgate Dr.	8.40	Picnic tables, barbecues, play equipment, basketball
Dutra Estates Park	2701 Ancestry St.	5.27	Picnic tables, barbecues, play equipment, basketball
Dutra Northeast Park	1282 Laurel Park Cr.	1.76	
Dutra Southeast Park	1850 Sparrowhawk St.	6.90	Picnic tables, barbecues, play equipment, tot lot, basketball
Franciscan Park	1041 Elm Ave.	4.02	Picnic tables, barbecues, play equipment
Gonsalves/Cambridge Greenbelt	407 Fishback Rd.	3.40	Greenbelt
Graystone Park	810 Agate Ave.	5.19	Picnic tables, play equipment, tot lot, basketball, baseball backstop
Hildebrand Park	431 Pine St.	0.58	Picnic tables, barbecues, play equipment, tot lot, basketball
Mayor's Park	1440 Kelley Dr.	4.03	Picnic tables, barbecues, play equipment, basketball
Mini Park	246 Elm St.	0.17	Picnic tables
Moffat Basin Park	800 Moffat Blvd.	1.60	Basin
Paseo Circle Park	1759 Buena Vista Dr.	1.03	Picnic tables
Primavera Park	1253 Primavera Ave.	6.91	Picnic tables, barbecues, play equipment, tot lot
Quail Ridge Park	1020 Mission Ridge Dr.	3.07	Tot lot, basketball
Roberts Estates Park	1740 Rail St.	5.07	Picnic tables, barbecues, play equipment, tot lot
Rodoni Park	1006 Lucio St.	2.75	Picnic tables, play equipment, tot lot
Sequoia Park	868 Wawona St.	3.97	Picnic tables, play equipment, basketball
Shasta Park	955 E. Edison St.	10.96	Picnic tables, barbecues, play equipment, tot lot, basketball
Southside Park	409 Oregon St.	3.32	Picnic tables, barbecues, play equipment, tot lot, basketball
Springport Park	746 Pestana Ave.	6.45	Play equipment, baseball backstop
Springtime Park	1268 Springtime Ave.	4.04	Picnic tables, play equipment
St. Francis Park	1273 Devonshire Ave.	4.76	Picnic tables, barbecues, play equipment, basketball

NAME	*ADDRESS*	*ACRES*	*AMENITIES*
Stadium Plaza Park	2470 Daniels St.	4.77	Fountain
Terra Bella Park	1630 Luna Bella Ln.	3.39	Picnic tables, barbecues, play equipment, tot lot
Tesoro Park	1399 Tesoro Dr.	9.51	Picnic tables, barbecues, play equipment, tot lot
Union Ranch East Park	925 Raccoon Valley Dr.	7.50	Picnic tables, barbecues, play equipment, tot lot, basketball
Union Ranch West Park	1291 Parkview St.	3.64	Picnic tables, barbecues, play equipment, basketball, baseball backstop
Villa Ticino Park	1970 Geneva Wy.	5.60	Tot lot
Walnut Place Park	360 Victory Ave.	2.04	Open field
William Martin Park	1605 Maywood Ave.	1.56	Picnic tables, barbecues, play equipment, basketball
Yosemite Park	600 El Portal Ave.	5.00	Picnic tables, barbecues, play equipment, basketball, baseball backstop

SOURCE: CITY OF MANTECA PARKS AND RECREATION DEPARTMENT WEBSITE, HTTP://WWW.CI.MANTECA.CA.US/PARKS/FACILITIES/DEFAULT.HTM

OTHER AGENCY SERVICES

Manteca Unified School District

The Project site is located within the service boundaries of the Manteca Unified School District (MUSD). MUSD provides school services for grades K through 12 within the communities of Manteca, Lathrop, Stockton, and French Camp. The District is approximately 113 square miles and serves more than 23,000 students. MUSD operates 14 elementary and middle schools (grades K-8), four high schools (grades 9-12), one community day school (grades 7-12), and one vocational academy (grades 11-12). See Table 3.12-4 for the Manteca school inventory.

TABLE 3.12-4: CITY OF MANTECA SCHOOL INVENTORY

SCHOOL	*GRADES SERVED*	*ADDRESS*	*ENROLLMENT 2015-2016 SCHOOL YEAR*
ELEMENTARY AND MIDDLE SCHOOLS			
George McParland Elementary School	K-8	1601 Northgate Dr.	1,054
Stella Brockman Elementary School	K-8	763 Silverado Dr.	803
Brock Elliott Elementary School	K-8	1110 Stonum Ln.	812
Golden West Elementary School	K-8	1031 North Main St.	599
Joshua Cowell Elementary School	K-8	740 Pestana Ave.	577
Lincoln Elementary School	K-8	750 E Yosemite Ave.	589
Manteca Community Day	K-6	737 W Yosemite Ave.	10
Neil Hafley Elementary School	K-8	849 Northgate Dr.	779
New Haven Elementary School	K-8	14600 Austin Rd.	594
Nile Garden Elementary School	K-8	5700 E Nile Rd.	474
Sequoia Elementary School	K-8	710 Martha St.	745
Shasta Elementary School	K-8	751 E Edison St.	774
Veritas Elementary School	K-8	1600 Pagola Ave.	726
Walter Woodward Elementary School	K-8	575 Tannehill Dr.	880

SCHOOL	*GRADES SERVED*	*ADDRESS*	*ENROLLMENT 2015-2016 SCHOOL YEAR*
HIGH SCHOOLS			
Calla High School	9-12	130 S Austin Rd.	164
East Union High School	9-12	1700 N Union Rd.	1,579
Manteca Community Day School	7-12	737 W Yosemite Ave.	43
Manteca High School	9-12	450 E Yosemite Ave.	1,511
Sierra High School	9-12	1700 Thomas St.	1,358
Manteca Unified Vocational Academy (be.tech)	11-12	2271 W. Louise Ave.	208

SOURCE: CALIFORNIA DEPARTMENT OF EDUCATION EDUCATIONAL DEMOGRAPHICS UNIT ENROLLMENT FOR 2015-16.

As shown in Table 3.12-4, the schools in the City had a total enrollment of approximately 14,279 students, of which 9,416 were enrolled in elementary and middle school (grades K – 8) and 4,863 were enrolled in high school (grades 9 – 12).

Additionally, the MUSD currently operates three elementary schools and zero high schools within the area of Manteca south of State Route 120.[3] These three elementary schools have a combined permanent capacity of 2,560 students. During the 2015/2016 school year, the enrollment at these schools totaled 2,012 students, resulting in excess capacity of 548 future students. Further, excess capacity currently exists at the school facilities located north of State Route 120.

Library Services

The Manteca Branch Library, a branch library of the Stockton - San Joaquin County Library system, is located at 320 West Center Street. The library offers a circulating collection of books, magazines, CDs, and DVDs in both English and Spanish.

3.12.2 REGULATORY SETTING

STATE

Police Protection

There are no federal or state regulations related to police protection services applicable to the proposed Project.

[3] Breitenbucher, Jacqui. Senior Director of Business Services/Chief Business Officer, Manteca Unified School District. RE: Environmental Impact of Oakwood Landing – Cerri & Denali Subdivisions and recommended conditions of approval. September 12, 2016.

Fire Protection and Emergency Response

CALIFORNIA OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

In accordance with California Code of Regulations Title 8 Sections 1270 "Fire Prevention" and 6773 "Fire Protection and Fire Equipment" the California Occupational Safety and Health Administration (Cal/OSHA) has established minimum standards for fire suppression and emergency medical services. The standards include, but are not limited to, guidelines on the handling of highly combustible materials, fire hose sizing requirements, restrictions on the use of compressed air, access roads, and the testing, maintenance, and use of all firefighting and emergency medical equipment.

The State of California passed legislation authorizing the Office of Emergency Services (OES) to prepare a Standard Emergency Management System (SEMS) program, which sets forth measures by which a jurisdiction should handle emergency disasters. Non-compliance with SEMS could result in the State withholding disaster relief from the non-complying jurisdiction in the event of an emergency disaster.

EMERGENCY RESPONSE/EVACUATION PLANS

The State of California passed legislation authorizing the Office of Emergency Services (OES) to prepare a Standard Emergency Management System (SEMS) program, which sets forth measures by which a jurisdiction should handle emergency disasters. Non-compliance with SEMS could result in the State withholding disaster relief from the non-complying jurisdiction in the event of an emergency disaster.

FIRE PROTECTION

The California Fire Code contains regulations relating to construction and maintenance of buildings and the use of premises. Topics addressed in the Code include fire department access, fire hydrants, automatic sprinkler systems, fire alarm systems, fire and explosion hazards safety, hazardous materials storage and use, provisions to protect and assist first responders, industrial processes, and many other general and specialized fire safety requirements for new existing buildings and premises.

UNIFORM FIRE CODE

The Uniform Fire Code with the State of California Amendments contains regulations relating to construction, maintenance, and use of buildings. Topics addressed in the California Fire Code include fire department access, fire hydrants, automatic sprinkler systems, fire alarm systems, fire and explosion hazards safety, hazardous materials storage and use, provisions intended to protect and assist fire responders, industrial processes, and many other general and specialized fire-safety requirements for new and existing buildings and the surrounding premises. The Fire Code contains specialized technical regulations related to fire and life safety.

CALIFORNIA HEALTH AND SAFETY CODE

State fire regulations are set forth in Sections 13000 et seq. of the California Health and Safety Code. This includes regulations for building standards (as also set forth in the California Building Code), fire protection and notification systems, fire protection devices such as extinguishers and smoke alarms, high-rise building and childcare facility standards, and fire suppression training.

NFPA 1710

The NFPA 1710 Standards are applicable to urban areas and where staffing is comprised of career Firefighters. According to these guidelines, a career fire department needs to respond within six minutes, 90 percent of the time with a response time measured from the 911 call to the time of arrival of the first responder.

The standards are divided as follows:

- Dispatch time of one (1) minute or less for at least 90 percent of the alarms
- Turnout time of one (1) minute or less for EMS calls (80 seconds for fire and special operations response)
- Fire response travel time of four (4) minutes or less for the arrival of the first arriving engine company at a fire incident and eight (8) minutes or less travel time for the deployment of an initial full alarm assignment at a fire incident
- Eight (8) minutes or less travel time for the arrival of an advanced life support (ALS) (4 minutes or less if provided by the fire department

Parks/Recreation

QUIMBY ACT

The Quimby Act (California Government Code Section 66477) states that "the legislative body of a city or county may, by ordinance, require the dedication of land or impose a requirement of the payment of fees in lieu thereof, or a combination of both, for park or recreational purposes as a condition to the approval of a tentative or parcel map." Requirements of the Quimby Act apply only to the acquisition of new parkland and do not apply to the physical development of new park facilities or associated operations and maintenance costs. The Quimby Act seeks to preserve open space needed to develop parkland and recreational facilities; however, the actual development of parks and other recreational facilities is subject to discretionary approval and is evaluated on a case-by-case basis with new residential development. The City collects fees imposed by the park and recreation districts impact fees. The impact fees are collected at the time of building permit and include both capital impacts and land acquisition.

Schools

CALIFORNIA CODE OF REGULATIONS

The California Code of Regulations, Title 5 Education Code, governs all aspects of education within the State.

CALIFORNIA DEPARTMENT OF EDUCATION

The California Department of Education (CDE) School Facilities Planning Division (SFPD) prepared a School Site Selection and Approval Guide that provides criteria for locating appropriate school sites in the State of California. School site and size recommendations were changed by the CDE in 2000 to reflect various changes in educational conditions, such as lowering of class sizes and use of advanced technology. The expanded use of school buildings and grounds for community and agency joint use and concern for the safety of the students and staff members also influenced the modification of the CDE recommendations.

Specific recommendations for school size are provided in the School Site Analysis and Development Guide. This document suggests a ratio of 1:2 between buildings and land. CDE is aware that in a number of cases, primarily in urban settings, smaller sites cannot accommodate this ratio. In such cases, the SFPD may approve an amount of acreage less than the recommended gross site size and building-to-ground ratio.

Certain health and safety requirements for school site selection are governed by state regulations and the policies of the SFPD relating to:

- Proximity to airports, high-voltage power transmission lines, railroads, and major roadways;
- Presence of toxic and hazardous substances;
- Hazardous facilities and hazardous air emissions within one-quarter mile;
- Proximity to high-pressure natural gas lines, propane storage facilities, gasoline lines, pressurized sewer lines, or high-pressure water pipelines;
- Noise;
- Results of geological studies or soil analyses;
- Traffic and school bus safety issues.

THE KINDERGARTEN-UNIVERSITY PUBLIC EDUCATION FACILITIES BOND ACT OF 2002 (PROP 47)

This act was approved by California voters in November 2002 and provides for a bond issue of $13.05 billion to fund necessary education facilities to relieve overcrowding and to repair older schools. Funds will be targeted at areas of greatest need and must be spent according to strict accountability measures. Funds will also be used to upgrade and build new classrooms in the California Community Colleges, the California State University, and the University of California in order to provide adequate higher education facilities to accommodate growing student enrollment.

LEROY F. GREENE SCHOOL FACILITIES ACT OF 1998 (SB 50)

The "Leroy F. Greene School Facilities Act of 1998," also known as Senate Bill No. 50 or SB 50 (Chapter 407, Statutes of 1998), governs a school district's authority to levy school impact fees. This comprehensive legislation, together with the $9.2 billion education bond act approved by the voters in November 1998 known as "Proposition 1A", reformed methods of school construction financing in California. SB 50 instituted a new school facility program by which school districts can

apply for state construction and modernization funds. It imposed limitations on the power of cities and counties to require mitigation of school facilities impacts as a condition of approving new development and provided the authority for school districts to levy fees at three different levels:

- **Level I** fees are the current statutory fees allowed under Education Code 17620. This code section provides the basic authority for school districts to levy a fee against residential and commercial construction for the purpose of funding school construction or reconstruction of facilities. These fees vary by district for residential construction and commercial construction and are increased biannually.
- **Level II** fees are outlined in Government Code Section 65995.5, allowing school districts to impose a higher fee on residential construction if certain conditions are met. These conditions include having a substantial percentage of students on multi-track year-round scheduling, having an assumed debt equal to 15–30 percent of the district's bonding capacity (percentage is based on revenue sources for repayment), having at least 20 percent of the district's teaching stations housed in relocatable classrooms, and having placed a local bond on the ballot in the past four years which received at least 50 percent plus one of the votes cast. A Facility Needs Assessment must demonstrate the need for new school facilities for unhoused pupils is attributable to projected enrollment growth from the construction of new residential units over the next five years.
- **Level III** fees are outlined in Government Code Section 655995.7. If State funding becomes unavailable, this code section authorizes a school district that has been approved to collect Level II fees to collect a higher fee on residential construction. This fee is equal to twice the amount of Level II fees. However, if a district eventually receives State funding, this excess fee may be reimbursed to the developers or subtracted from the amount of state funding.

The MUSD currently requires Level I fees for residential and commercial construction. The MUSD cannot increase to Level II fees due to the excess capacity at the existing schools located north of State Route 120. However, the MUSD is currently completing a demographic study in order to mitigate for future school facilities located south of State Route 120.[4]

LOCAL

City of Manteca Municipal Code

The City of Manteca Municipal Code, Fee Schedule VI *Development Fee* includes development impact fees to fund public facilities, including the San Joaquin County Facilities Fee to fund police services.

[4] Personal Communication with Jacqui Breitenbucher, Senior Director of Business Services/Chief Business Office, MUSD. September 27, 2016.

City of Manteca General Plan

POLICIES: POLICE PROTECTION

- PF-P-39. The City shall endeavor through adequate staffing and patrol arrangements to maintain the minimum feasible police response times for police calls.
- PF-P-40. The City shall provide police services to serve the existing and projected population.
- PF-P-41. The City will establish the criteria for determining the circumstances under which police service will be enhanced.

POLICIES: FIRE PROTECTION

- PF-P-42. The City shall endeavor to maintain an overall fire insurance (ISO) rating of 4 or better.
- PF-P-43. The City shall endeavor through adequate staffing and station locations to maintain the minimum feasible response time for fire and emergency calls.
- PF-P-44. The City shall provide fire services to serve the existing and projected population.
- PF-P-45. The City will establish the criteria for determining the circumstances under which fire service will be enhanced.

POLICIES: PARKS AND RECREATION

- PF-P-46. The City shall expand the community and neighborhood park system with the goal of providing neighborhood park facilities within reasonable walking distance of all city residential areas.
- PF-P-47. The City shall use joint development of park and drainage detention basins in the development of neighborhood parks.
- PF-P-48. The City shall cooperate with the Manteca Unified School District in opportunities for joint-use of school and park and recreational facilities.
- PF-P-49. City park acquisition and development efforts shall be based on a goal of 5 acres of developed neighborhood and community parkland per 1,000 residents within the city limits. The distribution of land between neighborhood and community parks shall be determined within the Parks and Recreation Master Plan.
- PF-P-50. Neighborhood parks shall conform to the following general guidelines (specific details and standards to be determined within the Parks and Recreation Master Plan):
    - The typical minimum size shall be set to support active and passive recreation activities.
    - The typical service area for a neighborhood park is approximately ¼ mile walking distance.
    - Neighborhood parks shall include a turf area above the basin flood line of sufficient area to be used for playgrounds, sports, picnic areas, and other recreational facilities.

- PF-P-51. The City shall aggressively pursue State and County funding to supplement City revenues to the extent such funding is available.
- PF-P-52. The City shall endeavor to identify, acquire, and develop one or more community parks as defined in the Parks and Recreation Master Plan.
- PF-P-53. All new residential development will be required to pay a park acquisition and improvement fee, based on providing 5 acres per 1,000 residents, to fund system-wide improvements.
- PF-P-54. The City shall require the provision of private open space and recreational facilities as part of new residential developments.
- PF-P-55. The City shall not discourage the expansion of private commercial recreational facilities.
- PF-P-56. The City shall develop a convenient system of pedestrian sidewalks and pathways linking City parks, major open space areas, and the downtown core.
- PF-P-57. The City shall adopt a Bicycle Route Master Plan and develop a bicycle route system linking areas, schools, public facilities, the downtown core, and neighborhoods.

POLICIES: EDUCATION

- PF-P-33. The City shall cooperate with the Manteca Unified School District and others in locating and reserving appropriate sites for new neighborhood walking distance schools. Adequate facilities shall be planned to accommodate new residential development and endeavor to create neighborhood schools.
- PF-P-34. The City shall cooperate with the Manteca Unified School District in their collection of school facility development fees from new development.
- PF-P-35. Financing of new school facilities will be planned concurrent with new development.
- PF-P-36. The City and Manteca Unified School District will work together to develop criteria for the designation of school sites and consider opportunities for reducing the cost of land for school facilities. The City will encourage the school district to comply with City standards in the design and landscaping of school facilities.
- PF-P-37. The City will consider opportunities for joint-use of facilities with the school district. When feasible, a joint-use agreement will be pursued to maximize public use of facilities, minimize duplication of services provided, and facilitate shared financial and operational responsibilities.
- PF-P-38. Schools must be located away from hazards of sensitive resource conservation areas, except where the proximity of resources may be of educational value and the protection of resources is reasonably assured.

3.12.3 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the proposed Project will have a significant impact on public services if it would result in:

- Substantial adverse physical impacts associated with the provisions of new or physically altered government facilities, and/or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services:
    - Police Protection
    - Fire Protection
    - Parks and Recreation
    - Schools
    - Other public facilities
- Include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment.
- Would increase the use of existing neighborhood and regional parks or other recreational facilities, such that substantial physical deterioration of the facility would occur or be accelerated.

IMPACTS AND MITIGATION MEASURES

Impact 3.12-1: The proposed Project has the potential to require the construction of police department facilities which may cause substantial adverse physical environmental impacts. (Less than Significant)

The City's General Plan includes policies and implementation measures that would allow for the Manteca Police Department to continue providing adequate staffing levels. Below is a list of relevant policies:

- The City shall endeavor through adequate staffing and patrol arrangements to maintain the minimum feasible police response times for police calls. Currently the City has 63 sworn officers. With a population of 71,164, that equates to a staffing level of .85 officers per 1000 residents.
- The City shall provide police services to serve the existing and projected population. The Police Department will continuously monitor response times and report annually on the results of the monitoring.

Impact fees from new development are collected based upon projected impacts from each development. The adequacy of impact fees is reviewed on an annual basis to ensure that the fee is commensurate with the service. Payment of the applicable impact fees by the Project applicant,

and ongoing revenues that would come from property taxes, sales taxes, and other revenues generated by the proposed Project, would fund capital and labor costs associated with police services.

Based on the current adequacy of existing response times and the ability of the MPD to serve the City, it is anticipated that the existing police department facilities are sufficient to serve the proposed Project. Consequently, any impacts would be **less than significant**.

Impact 3.12-2: The proposed Project has the potential to require the construction of fire department facilities which may cause substantial adverse physical environmental impacts. (Less than Significant)

The City of Manteca General Plan 2023 includes policies and implementation measures that would allow for the Department to continue providing adequate facilities and staffing levels. Below is a list of relevant policies:

- The City shall endeavor to maintain an overall fire insurance (ISO) rating of 4 or better (Policy PF-P-42).
- The City shall endeavor through adequate staffing and station locations to maintain the minimum feasible response time for fire and emergency calls (PF-P-43).
- The City shall provide fire services to serve the existing and projected population (PF-P-44).
- The City will establish the criteria for determining the circumstances under which fire service will be enhanced (PF-P-45).
- The Fire Department shall continuously monitor response times and report annually on the results of the monitoring (PF-I-24).
- The City shall encourage a pattern of development that promotes the efficient and timely development of public services and facilities (LU-P-3).

The Manteca Fire Department maintains a goal for the initial company of three (3) firefighters to arrive on scene for fire and emergency medical service (EMS) incidents within five (5) minutes 90% of the time (Response Effectiveness). In 2013 the department averaged a 4:35 response time City-wide and was on scene within (5) minutes 71% of the time. On September 11, 2013, Fire Station No. 4 opened in northwest Manteca. The 2014 data shows that the response time to this area has dropped by 42%. Since opening Station No. 4, the northwest portion of the City has seen a significant reduction in response time and greater response effectiveness. In the northwest portion of the City, response times have decreased from approximately six minutes to approximately four minutes.[5] Therefore, the addition of Fire Station No. 4 has improved both the average response time and the percent of response effectiveness.

[5] Personal Communication with Lantz Rey, City of Manteca Fire Department Fire Marshal. July 19, 2016.

The construction of Fire Station No. 5, which is planned in southeast Manteca at the intersection of Woodward Avenue and Atherton Drive, will have a similar impact on response times and response effectiveness. According to the City's Preliminary Budget for Fiscal Year 2016/2017, the City is in the process of completing 30 percent of the design of this station with the intent of constructing and staffing this station by the 2019/2020 fiscal year[6] Funding for this station is dependent on additional annexations and development. The construction and staffing of Fire Station No. 5 will allow the City the ability to achieve the full alarm standard outlined by NFPA 1710 for the first time in the City's History; this will directly affect the ISO rating, enhance service to the citizens of Manteca and improve the department's ability to obtain grants.

Impact fees from new development are collected based upon projected impacts from each development. The adequacy of impact fees is reviewed on an annual basis to ensure that the fee is commensurate with the service. Payment of the applicable impact fees by the Project applicant, and ongoing revenues that would come from property taxes, sales taxes, and other revenues generated by the proposed Project, would fund capital and labor costs associated with fire protection services. Therefore, the impact of the proposed Project on the need for additional fire services facilities is **less than significant**.

Impact 3.12-3: The proposed Project has the potential to require the construction of school facilities which may cause substantial adverse physical environmental impacts. (Less than Significant)

The proposed Project is located within the service boundaries of the MUSD. MUSD provides school services for grades K through 12 within the communities of Manteca, Lathrop, Stockton, and French Camp. MUSD operates 14 elementary and middle schools (grades K – 8), four high schools (grades 9 – 12), one community day school (grades 7 – 12), and one vocational academy (grades 11 – 12). The schools in the City had a total enrollment of approximately 14,279 students, of which 9,416 were enrolled in elementary and middle school (grades K – 8) and 4,863 were enrolled in high school (grades 9 – 12).

The proposed Project includes residential units that would directly increase the student population in the area. The proposed Project may indirectly increase the number of persons in the area as a result of employment potential; however, it is not possible to determine at this time whether employment opportunities would be utilized by the existing population with existing students in the schools or if employees would be recruited from outside the region, bringing new students to Manteca.

[6] Personal Communication with Lantz Rey, City of Manteca Fire Department Fire Marshal. July 12, 2016.

The proposed Project would include the development of 1,265 dwelling units, which would directly cause population growth and increase enrollment in the local school districts. Utilizing the student generation rates provided by the MUSD in the NOP comment letter for the proposed Project (dated September 12, 2016), the proposed Project would be expected to generate roughly 899 new students, broken down by grades as follows:

- K–8: 608 students
- 9–12: 291 students

Based on an analysis of MUSD's current developer impact fees, the MUSD expects to experience a significant shortfall in the funds needed to mitigate the impacts of the proposed Project. Table 3.12-5 shows the projected net fiscal impact of the Project.

TABLE 3.12-5: PROPOSED PROJECT SCHOOL FEES

ITEM	*ELEMENTARY SCHOOL (K-8)*	*HIGH SCHOOL (9-12)*	*TOTAL*
Fiscal Impact per Unit	$13,755	$16,682	$30,437
Estimated State Funding per Unit	$7,066	$4,135	$11,201
Estimated School Fees per Unit			$9,744
Net Fiscal Impact per Unit			*$9,492*
Planned Residential Units within Proposed Project			1,265
		Total Net Fiscal Impact	***$12,007,380***

SOURCE: MUSD, RE: ENVIRONMENTAL IMPACT OF OAKWOOD LANDING – CERRI & DENALI SUBDIVISIONS AND RECOMMENDED CONDITIONS OF APPROVAL. SEPTEMBER 2016.

As shown in the table, the funding shortfall per unit as a result of the proposed Project would be approximately $9,492. As noted previously, the MUSD currently requires Level I fees for residential and commercial construction. The MUSD cannot increase to Level II fees due to the excess capacity at the existing schools located north of State Route 120. However, the MUSD is currently completing a demographic study in order to mitigate for future school facilities located south of State Route 120. Upon completion of the demographic study, future development within the city may be subject to increased Level II fees.

MUSD has previously indicated that there is a need for a new elementary and a new high school in the Project vicinity and MUSD has purchased a 17-acre school site adjacent to the Project site. Until new school facilities are developed, students within the Project site would most likely attend Nile Garden School and Veritas Elementary School, and Sierra High School, subject to MUSD's determination.

The MUSD collects impact fees from new developments under the provisions of SB 50. Payment of the applicable impact fees by the Project applicant, and ongoing revenues that would come from taxes, would fund capital and labor costs associated with school services. The adequacy of fees is reviewed on an annual basis to ensure that the fee is commensurate with the service. Payment of the applicable impact fees by the Project applicant, and ongoing revenues that would come from

property taxes, sales taxes, and other revenues generated by the proposed Project, would fund improvements associated with school services. Therefore, the impact of the proposed Project on the need for additional school facilities is **less than significant**.

Impact 3.12-4: The proposed Project has the potential to have effects on other public facilities. (Less than Significant)

The proposed Project will bring residents and could bring employees to the area which may require the use of other public services such as libraries, etc. The City collects impact fees from new development based upon projected impacts from each development, including impacts on other public services. The City also reviews the adequacy of impact fees on an annual basis to ensure that the fee is commensurate with services provided. Payment of the applicable impact fees by the Project applicant, and ongoing revenues that would come from property taxes, sales taxes, and other revenues generated by the proposed Project, would fund capital and labor costs associated with these other public services.

The proposed Project does not trigger the need for new facilities associated with other public services. Consequently, new facilities for other public services are not proposed at this time. The proposed Project would not result in the need for new facilities for other public services, thus it will have a **less-than-significant** impact relative to this topic.

Impact 3.12-5: The proposed Project has the potential to require the construction of park and recreational facilities which may cause substantial adverse physical environmental impacts. (Less than Significant with Mitigation)

The proposed Project directly increases the number of persons in the area as a result of employment potential, and residential uses. The proposed Project includes 1,265 residential units, which is projected to increase the population by an estimated 3,959 (based on 3.13 persons per household). According the most recent U.S. Census (2014) and Department of Finance (2016) estimates, the average number of persons residing in a dwelling unit in the City of Manteca is 3.13. For the purposes of extractive and collecting fees to mitigate for increase park demands (Quimby Act), the California Government Code Section 66477 states: *The amount of land dedicated or fees paid shall be based upon the residential density, which shall be determined on the basis of the approved or conditionally approved tentative map or parcel map and the average number of persons per household. There shall be a rebuttable presumption that the average number of persons per household by units in a structure is the same as that disclosed by the most recent available federal census or a census taken pursuant to Chapter 17 (commencing with Section 40200) of Part 2 of Division 3 of Title 4.*

Therefore, for the purposes of calculating park mitigation fees, as required by Mitigation Measure 3.13-1, the 2015 Census figure of 3.13 persons per household shall be applied to the proposed Project.

The proposed Project includes an additional 16.06 acres of park space to serve the community and surrounding area. The City's General Plan identifies a park standard based on a goal of five acres of developed parkland per 1,000 residents within the city limits. Further, the City's Parks and Recreation Master Plan (December 2016) states that the City currently strives to provide 3.5 acres of Neighborhood Park land per thousand residents, and 1.5 acres of Community Park land. Due to the active sports needs of the community, the recommendation of the City's Master Plan is to shift the acreage goals to achieve a better balance of park land in the future, resulting in a new goal for developing adequate Special Use Park land. The total goal of 5 acres per 1,000 residents remains intact, and the summary of the goals is broken down below:

- Neighborhood Park: 3 acres / 1,000 residents
- Community Park: 1 acre / 1,000 residents
- Special Use Park: 1 acre / 1,000 residents

According to the Master Plan, the City currently has a deficit of 5.67 acres of Neighborhood Park, and a surplus of Community Parks (5.58 acres) and Special Use Parks (18.06 acres). The addition of 16.06 acres of park space falls short of the five acre per 1000 goal by 3.735 acres. Parks may include community or neighborhood parks with active and passive components as approved by the City. The Project would also maintain approximately 6.77 acres of open space in the southernmost portion of the site. The Project developer would be required to pay the City of Manteca parkland dedication in lieu fee which would be used to pay for development of park space. As such, with the addition of the proposed park space and implementation of the following mitigation, the proposed Project will result in a **less-than-significant** impact.

MITIGATION MEASURE(S)

Mitigation Measure 3.12-1: *Prior to the issuance of a building permit, the developer shall verify that sufficient park area is provided for the respective projects in accordance with the Quimby Act and City Ordinances. If sufficient park area is not provided within each individual project in accordance with the Quimby Act and City Ordinances, the Project applicant shall pay applicable park in lieu fees to the City of Manteca for the value of the remaining parkland obligation. This requirement shall be included in the Improvement Plans for approval by the Building Department prior to the issuance of building permits.*

Impact 3.12-6: The proposed Project has the potential to increase the use of existing neighborhood and regional parks or other recreational facilities, such that substantial physical deterioration of the facility would occur or be accelerated. (Less than Significant)

As stated previously, the proposed Project will directly, and may indirectly increase the number of persons in the area as a result of employment potential and visitor-serving uses. It is not

anticipated that the proposed Project would result in a significant increase in the use of existing neighborhood and regional parks or other recreational facilities from people associated with the employment potential and visitor-serving uses. The proposed Project does, however, include extensive new recreational facilities for the community and residents within the Project site, which more than offset any new demand for parks or recreational facilities that could result from the employment potential and residential uses.

The proposed Project would not significantly increase the use of an existing park, or other recreational facility. Therefore, it is not anticipated that any substantial physical deterioration of existing facilities would occur or be accelerated. As such, the proposed Project would have a **less-than-significant** impact relative to this topic.

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This section of the EIR analyzes the potential impacts of the proposed Oakwood Landing – Cerri & Denali Subdivisions Project on the surrounding transportation system including roadways, bicycle/pedestrian facilities, rail, and transit facilities/services. This chapter identifies the significant impacts of the proposed Project and recommends mitigation measures to lessen their significance. An evaluation of vehicular access to the Project is also provided. All technical calculations can be found in Appendix E.

3.13.1 ENVIRONMENTAL SETTING

PROJECT LOCATION

The 258.29-acre Project site is located south of State Route (SR) 120 and west of Airport Way in the City of Manteca, San Joaquin County. Access to the Project would be provided by Atherton Drive, Woodward Avenue, and McKinley Avenue. Portions of Atherton Drive and McKinley Avenue would be constructed as part of the Project. Figure 3.13-1 displays the regional location of the Project site relative to the surrounding transportation system. Figure 3.13-2 presents the Project site plan.

STUDY AREA ROADWAYS AND INTERSECTIONS

The following describes the key roadways in the study area.

State Route (SR) 120 is an east-west four-lane freeway within the study area that connects Interstate (I) 5 and SR 99 through south Manteca. This roadway features interchanges at Yosemite Avenue, Airport Way, Union Road, and Main Street. SR 120 is grade-separated above McKinley Avenue and has a posted speed limit of 65 miles per hour (mph).

McKinley Avenue is a north-south two-lane rural road that extends north from Woodward Avenue under SR 120 to Lathrop Road. South of Yosemite Avenue, McKinley Avenue has a posted speed limit of 50 mph and permits passing in certain sections. An interchange with SR 120 is planned at McKinley Avenue.

Airport Way is a north-south roadway that extends from downtown Stockton into Manteca, and continues south beyond SR 120 into unincorporated San Joaquin County. Between Woodward Avenue and SR 120, Airport Way is two-lanes with a posted speed limit of 40 mph. Airport Way widens to four lanes north of the SR 120 westbound ramp-terminal intersection to Daniels Street. North of Daniels Street, Airport Way narrows to two lanes.

Yosemite Avenue is generally an east-west, two- to four-lane roadway that extends from the SR D'Arcy Parkway east, through the City of Manteca, and has an interchange at SR 99, just north of the SR 99/SR 120 interchange. Yosemite Avenue is a two-lane undivided roadway from D'Arcy Parkway to McKinley Avenue and then transitions from a two-lane roadway (with center turn lane) to a four-lane roadway (with center turn lane) from McKinley Avenue to Airport Way.

Woodward Avenue is an east-west roadway located south of SR 120 extending from Moffat Avenue in the east to west of McKinley Avenue near the I-5 / SR 120 interchange. Woodward Avenue is primarily a two-lane road west of Main Street. East of Main Street, it widens to four lanes until Bridewell Avenue, narrows to three lanes (two lanes westbound and one lane eastbound) to Atherton Drive, and further narrows to two lanes from Atherton Drive to Moffat Avenue. Woodward Avenue has a posted speed limit of 45 mph.

Atherton Drive is an east-west road that frontages SR 120 to the south. Atherton Drive is a four-lane road through the study area and has a speed limit of 45 mph. Atherton Drive terminates east of McKinley Avenue and just west of Hearthsong Drive.

EXISTING PEDESTRIAN AND BICYCLE FACILITIES

Pedestrian and bicycle facilities currently do not exist along the Project frontage. In the vicinity of the Project site, sidewalks exist east of the South McKinley Avenue / Woodward Avenue intersection. Crosswalks are not present within the vicinity of the Project site. Sidewalks are not present at the SR 120 interchanges at Guthmiller Road and Airport Way.

Bicycle facilities in the Project vicinity consist of a Class I bike path (off-street) on Atherton Drive and a Class II bike lane (on-street with appropriate signage and striping) on Airport Way south of Atherton Drive. Figure 3.13-3 presents the existing pedestrian and bicycle facilities within the study area.

TRANSIT SERVICE

Public transit in the study area includes both bus and rail passenger components. Bus service is provided by Manteca Transit, while rail passenger service is provided by Altamont Commuter Express (ACE).

The nearest existing transit stop is provided on Daniels Street west of Milo Candini Drive. This stop services Manteca Transit bus routes 1, 2, and 3. Route 1 runs in a generally east-west direction along Yosemite Boulevard, through downtown, to east of SR 99. Routes 2 and 3 operate in a counter-directional loop system that connects the northern and southern areas of the City. Service runs from about 6:30 AM to 6:30 PM on one-hour headways during weekdays. Adult fares run $1 per ride.

The ACE regional passenger rail service operates a commuter rail service between Stockton and San Jose. The Lathrop-Manteca ACE Rail Station is located at the northeast corner of the McKinley Avenue / Yosemite Avenue intersection, approximately 1.5 miles from the Project site. Manteca bus service does not currently stop at this ACE station.

RAIL

The study area includes a Union Pacific Railroad (UPRR) track that extends southerly from Stockton between Airport Way and McKinley Avenue. The track (i.e., Oakland Subdivision line)

features at-grade crossings with Yosemite Avenue and McKinley Avenue. Table 3.13-1 provides an inventory of train crossings, equipment, and the accident history at each crossing based on USDOT data.[1]

Both at-grade crossings have advanced warning signs, railroad crossing pavement markings, stop lines, crossing gates, flashing lights, and warning bells. According to US Department of Transportation Crossing Inventory, an average of 13 trains per day use this line. The last reported collision at the Yosemite Avenue crossing occurred in 1993. The McKinley Avenue crossing has not had any reported collisions.

TABLE 3.13-1: INVENTORY OF AT-GRADE RAILROAD CROSSINGS IN STUDY AREA

CROSSING #	LOCATION	TRAIN ACTIVITY		EQUIPMENT PRESENT	VEHICULAR CONDITIONS		ACCIDENT HISTORY
		# OF DAILY TRAINS[1]	AVE. SPEED RANGE		# OF LANES	ESTIMATED ADT[2]	
833918C	Yosemite Avenue	13	30 to 50 mph	advanced warning signs, stop lines, RR Xing symbols, gates, bells	2	7,000	No reported accidents since 1993. Four reported accidents between 1979 and 1993.
833917V	McKinley Avenue	13	30 to 50 mph	advanced warning signs, stop lines, RR Xing symbols, gates, bells	2	1,700	None reported.

NOTES:

[1] 8 OF THE 13 TRAINS ARE ACE COMMUTER RAIL TRAINS.

[2] ESTIMATED ADT CALCULATED ASSUMING THE AM AND PM PEAK HOUR VOLUMES ARE 16% OF DAILY. VALUES ROUNDED TO THE NEAREST 100 VEHICLES.

SOURCE: FEDERAL RAILROAD ADMINISTRATION OFFICE OF SAFETY ANALYSIS AND FEHR & PEERS, APRIL 2015.

3.13.2 ANALYSIS METHODS

The operational performance of the roadway network is commonly described with the term Level of Service, or LOS. LOS is a qualitative description of operating conditions, ranging from LOS A (free-flow traffic conditions with little or no delay) to LOS F (oversaturated conditions where traffic flows exceed design capacity, resulting in long queues and delays). The LOS analysis methods outlined in the *Highway Capacity Manual* (HCM) (Transportation Research Board, 2000 and 2010) were used in this study.

[1] Available at: http://safetydata.fra.dot.gov/OfficeofSafety/PublicSite/Crossing/XingLocResults.aspx?state=06&countycity=115&railroad=&reportinglevel=ALL&radionm=County&street=&xingtype=%25&xingstatus=%25&xingpos=%25.

Table 3.13-2 summarizes the relationship between the control delay and LOS for signalized and unsignalized intersections. The delay ranges for unsignalized intersections are lower than for signalized intersections as drivers expect less delay at unsignalized intersections.

TABLE 3.13-2: INTERSECTION LOS CRITERIA

LEVEL OF SERVICE	DESCRIPTION (FOR SIGNALIZED INTERSECTIONS)	AVERAGE CONTROL DELAY PER VEHICLE (SECONDS)	
		SIGNALIZED INTERSECTIONS	UNSIGNALIZED INTERSECTIONS
A	Operations with very low delay occurring with favorable traffic signal progression and/or short cycle lengths.	≤ 10.0	≤ 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 10.0 to 20.0	> 10.0 to 15.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 20.0 to 35.0	> 15.0 to 25.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	> 35.0 to 55.0	> 25.0 to 35.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	> 55.0 to 80.0	> 35.0 to 50.0
F	Operations with delays unacceptable to most drivers occurring due to over-saturation, poor progression, or very long cycle lengths.	> 80.0	> 50.0

SOURCE: HIGHWAY CAPACITY MANUAL, TRANSPORTATION RESEARCH BOARD, 2010.

The HCM procedures were applied using the Synchro 9 traffic analysis software. The Synchro analysis relies on peak hour factors and heavy vehicle percentages that were measured in the field. Other model inputs include lane configurations, traffic volumes, and traffic controls (including signal phasing/timing). For side-street stop-controlled intersections, delay is calculated for each stop-controlled movement and for the uncontrolled left turns, if any, from the main street. The delay and LOS for the entire intersection and for the worst movement are reported for side-street stop intersections.

Per Caltrans District 10 standards, freeway mainline segment operations are evaluated using methodologies from the Transportation Research Board's 2010 *Highway Capacity Manual* using the HCS 2010 software program. The LOS for a freeway mainline segment is based on the vehicle density (passenger cars/lane/mile) as shown in Table 3.13-3. For future conditions, SR 120 will be widened by Year 2035 from four to six travel lanes to provide additional capacity for traffic traveling to and from the San Francisco Bay Area. In addition, auxiliary lanes will be constructed between interchanges to improve freeway operations of vehicles entering and exiting SR 120. Because these auxiliary lanes are not capacity improvements, the SR 120 freeway mainline was evaluated using the HCM mainline segment analysis methodology.

The performance LOS for merge and diverge sections is computed in one of two ways. If both the ramp and the adjacent freeway mainline segment are under capacity, then LOS is based on the density of the ramp junction. If either the ramp or the adjacent freeway mainline segment have reached (or exceed) capacity, then the merge/diverge segment is considered to operate at LOS F regardless of the computed ramp junction density. The LOS for ramp junctions is based on the vehicle density (passenger cars/lane/mile) as shown in Table 3.13-3.

TABLE 3.13-3: FREEWAY LEVEL OF SERVICE DEFINITIONS

LEVEL OF SERVICE[1]	*MAINLINE (DENSITY)*[1]	*RAMP JUNCTIONS (DENSITY)*[1]
A	≤ 11	≤ 10
B	> 11 to 18	> 10 to 20
C	> 18 to 26	> 20 to 28
D	> 26 to 35	> 28 to 35
E	> 35 to 45	> 35
F	> 45 or Demand Exceeds Capacity[2]	Demand Exceeds Capacity[2]

NOTES: [1] *DENSITY EXPRESSED IN PASSENGER CAR EQUIVALENTS PER HOUR PER MILE PER LANE.*
[2] *OCCURS WHEN FREEWAY DEMAND EXCEEDS UPSTREAM (DIVERGE) OR DOWNSTREAM (MERGE) FREEWAY SEGMENT CAPACITY, OR IF OFF-RAMP DEMAND EXCEEDS OFF-RAMP CAPACITY*

SOURCE: HCM (TRANSPORTATION RESEARCH BOARD, 2010), EXHIBITS 11-5 AND 13-2.

ANALYSIS SCENARIOS

The transportation system was analyzed for the following scenarios:

Existing Conditions – establishes the existing setting, which is used to measure the significance of Project impacts.

Existing Plus Project Conditions – adds traffic from the proposed Project to existing conditions.

Cumulative (Year 2040) No Project Conditions – represents cumulative travel conditions based on output from the San Joaquin Council of Governments (SJCOG) Travel Demand Model assuming no development on the Project site.

Cumulative (Year 2040) Plus Project Conditions – adds traffic from the proposed Project to the Cumulative No Project condition.

These scenarios provide for a transportation impact analysis that supports a project-level environmental review of the proposed Project.

DATA COLLECTION

Study facilities were selected based on the Project's expected travel characteristics (i.e., location and amount of Project trips) as well as facilities susceptible to being impacted by the Project.

INTERSECTIONS

Twelve existing intersections were selected for study as well as seven future intersections including the Project access intersections. Traffic counts were obtained for the following study intersections from various on-going or recently completed projects near the study area, including the Family Entertainment Zone (FEZ) EIR, the South Lathrop Specific Plan, and the SR 120/McKinley Interchange PA/ED.

1. Yosemite Avenue / McKinley Avenue
2. Woodward Avenue / McKinley Avenue
3. Yosemite Avenue / Airport Way
4. Daniels Street / Airport Way
5. SR 120 WB Ramps / Airport Way
6. SR 120 EB Ramps / Airport Way
7. Atherton Drive / Airport Way
8. Woodward Avenue / Airport Way
9. SR 120 WB Ramps / Union Road
10. SR 120 EB Ramps / Union Road
11. Atherton Drive / Union Road
12. Woodward Avenue / Union Road
13. Atherton Drive/McKinley Avenue (future intersection)
14. Atherton Drive/Woodward Avenue (future intersection)
15. Atherton Drive/Oakwood Trails Driveway (future intersection)
16. Atherton Drive/Dutch Harbor Way (future intersection)
17. Woodward Avenue/Yukon Avenue (future intersection)
18. McKinley Avenue/Denali Drive (future intersection)
19. McKinley Avenue/Street B (future intersection)
20. SR 120 EB Ramps/McKinley Avenue (future intersection)
21. SR 120 WB Ramps/McKinley Avenue (future intersection)

All intersection turning movement counts were collected during the midweek AM peak period (6:30 – 9 AM) and PM peak period (3:30 – 6:00 PM). Counts included heavy vehicles, bicycles, and pedestrians. Weather conditions were dry and schools were in session at the time of all counts. Figure 3.13-4 displays the existing AM and PM peak hour traffic volumes at the study intersections. This figure also displays the existing traffic controls and lane configurations at each intersection.

SR 120 FREEWAY

Mainline vehicle counts calculated for the SR 120 / Union Road Interchange PA / ED and approved by Caltrans April 2016. These volumes were used to analyze the SR 120 corridor for this Project.

Freeway segment data for SR 120 was developed by applying an annual growth factor to mainline counts from the approved 2011 traffic volumes documented in the SR 120/McKinley Interchange PA/ED FINAL TOAR (April 2013). The freeway mainline counts were obtained from Caltrans'

Performance Measure System (PeMS) for every Tuesday, Wednesday and Thursday for the months of March, April, September, October, and November 2011 (excluding holidays) from a traffic monitoring station located on SR 120 under the Union Road overcrossing. Based on data contained on Caltrans Traffic Census Program webpage (http://traffic-counts.dot.ca.gov/), the annual yearly growth rate on SR 120 between I-5 (to the west) and SR 99 (to the east) was determined to be 1.5 percent per year. Therefore, a six percent (6%) growth rate (1.5% per year x 4 years) was applied to the approved 2011 volumes to determine preliminary Existing (Year 2015) AM and PM peak hour freeway mainline volumes.

It should be noted that the SR 120 freeway mainline counts were further adjusted based on the following methodology:

1. Additional ramp counts at the Union Road westbound and eastbound ramp terminal intersections were completed by Caltrans using Mio-Vision on March 16 and 17, 2016;
2. Certain higher volume movements were identified to be used in the Existing Conditions analysis for the Union Road interchange;
3. In addition, certain higher volume movements were also used for the Airport Way interchange;
4. For SR 120 WB during the AM peak hour, beginning the balancing from the mainline segment between SR 99 and Main Street results in lower volumes between Airport Way and Yosemite Avenue. Therefore, the mainline volume of the latter segment was kept constant (3,498 vehicles), and balanced **backwards**, so that the segment between SR 99 and Main St increased from 2,733 vehicles to 2,791 vehicles (+58 vehicles);
5. For SR 120 EB during the AM peak hour, beginning the balancing from the mainline segment between Yosemite Ave and Airport Way results in lower volumes between Main St and SR 99. Therefore, the mainline volume of the latter segment was kept constant (2,080 vehicles), and balanced **backwards**, so that the segment between Yosemite Ave and Airport Way increased from 2,074 vehicles to 2,159 vehicles (+85 vehicles);
6. For SR 120 WB during the PM peak hour, beginning the balancing from the mainline segment between Yosemite Ave and Airport Way results in lower volumes between Main St and SR 99. Therefore, the mainline volume of the latter segment is kept constant (2,616 vehicles), and balanced **forwards**, so that the segment between Yosemite Ave and Airport Way increases from 2,568 vehicles to 2,598 vehicles (+30 vehicles);
7. For SR 120 EB during the PM peak hour, beginning the balancing from the mainline segment between Main St and SR 99 results in lower volumes between Yosemite Ave and Airport Way. Therefore, the mainline volume of the latter segment is kept constant (4,146 vehicles), and balanced **forwards**, so the segment between Main St and SR 99 increases from 2,812 vehicles to 2,885 vehicles (+73 vehicles);
8. The adjusted volumes were re-submitted to Caltrans on Friday, March 15, 2016; and
9. The adjusted volumes for Existing Conditions were approved on Tuesday, March 19, 2016.

The following SR 120 study segments were analyzed. The distance between the Yosemite Avenue and the proposed McKinley Avenue and the existing Airport Way interchanges meet Caltrans minimum spacing standards. The section between successive on- and off-ramps has sufficient

length to qualify as a basic section. Therefore, SR 120 between Yosemite Avenue Road and Airport Way were analyzed as a freeway mainline segment in addition to the ramp merge and diverge analysis.

SR 120 Eastbound

1. SR 120 EB between Yosemite Avenue and Airport Way (mainline segment)
2. SR 120 EB off-ramp at Airport Way (diverge)
3. SR 120 EB on-ramp at Airport Way (merge)
4. SR 120 EB between Airport Way and Union Road (mainline)
5. SR 120 EB off-ramp at Union Road (diverge)
6. SR 120 EB on-ramp at Union Road (merge)

SR 120 Westbound

1. 7. SR 120 WB off-ramp at Union Road (diverge)
2. 8. SR 120 WB on-ramp at Union Road (merge)
3. 9. SR 120 WB between Union Road and Airport Way (mainline)
4. 10. SR 120 WB off-ramp at Airport Way (diverge)
5. 11. SR 120 WB on-ramp at Airport Way (merge)
6. 12. SR 120 WB between Airport Way and Yosemite Avenue (mainline)

EXISTING INTERSECTION OPERATIONS

Existing operations were analyzed for the weekday AM and PM peak hours at the study intersections. Table 3.13-4 displays the intersection analysis results. The data in this table indicates that the study intersections currently operate at LOS D or better with the exception of the minor street (eastbound left-turn) stop-controlled movement at the Atherton Drive/Airport Way intersection, which operates at LOS F during the AM peak hour. This occurs as a result of 173 vehicles attempting to find gaps and turn left onto northbound Airport Way towards the SR 120 interchange.

TABLE 3.13-4: INTERSECTION OPERATIONS – EXISTING CONDITIONS

INTERSECTION	JURISDICTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
			DELAY[1] (SEC/VEH)	LOS	DELAY[1] (SEC/VEH)	LOS
1. Yosemite Avenue / McKinley Avenue	City of Lathrop	All-Way Stop	12	B	17	C
2. Woodward Avenue / McKinley Avenue	City of Manteca	Side-Street Stop	3 (10)	A (B)	4 (11)	A (B)
3. Yosemite Avenue / Airport Way	City of Manteca	Traffic Signal	21	C	35	D
4. Daniels Street / Airport Way	City of Manteca	Traffic Signal	15	B	23	C
5. SR 120 WB Ramps / Airport Way	Caltrans	Traffic Signal	9	A	12	B
6. SR 120 EB Ramps / Airport Way	Caltrans	Traffic Signal	10	B	31	C
7. Atherton Drive / Airport Way	City of Manteca	Side-Street Stop	18 (97)	C (F)	10 (76)	A (F)
8. Woodward Avenue / Airport Way	City of Manteca	All-Way Stop	12	B	15	B
9. SR 120 WB Ramps / Union Road	Caltrans	Traffic Signal	9	A	11	B
10. SR 120 EB Ramps / Union Road	Caltrans	Traffic Signal	13	B	20	C
11. Atherton Drive / Union Road	City of Manteca	Traffic Signal	2	A	3	A
12. Woodward Avenue / Union Road	City of Manteca	All-Way Stop	12	B	20	C

NOTE:

[1] FOR SIGNALIZED AND ALL-WAY STOP CONTROLLED INTERSECTIONS, AVERAGE INTERSECTION DELAY IS REPORTED IN SECONDS PER VEHICLE FOR ALL APPROACHES. FOR SIDE-STREET STOP CONTROLLED INTERSECTIONS, THE DELAY AND LOS FOR THE MOST-DELAYED INDIVIDUAL MOVEMENT IS SHOWN IN PARENTHESES NEXT TO THE AVERAGE INTERSECTION DELAY AND LOS. ALL RESULTS ARE ROUNDED TO THE NEAREST SECOND.

SOURCE: FEHR & PEERS, 2016.

EXISTING PEAK HOUR TRAFFIC SIGNAL WARRANTS

Five of the twelve study intersections are currently controlled by stop signs. To assess the potential need for their signalization, applicable signal warrants from the *California Manual on Uniform Traffic Control Devices* (CA MUTCD), Caltrans, 2014 were consulted. The CA MUTCD includes eight potentially applicable signal warrants. Generally, meeting one of the signal warrants could justify signalization of an intersection. The results of the traffic signal warrant analysis are shown in Table 3.13-5.

TABLE 3.13-5: PEAK HOUR SIGNAL WARRANT ANALYSIS – EXISTING CONDITIONS

INTERSECTION	JURISDICTION	TRAFFIC CONTROL	AM/PM PEAK HOUR WARRANT MET? [1]
1. Yosemite Avenue / McKinley Avenue	City of Manteca	All-Way Stop	NO
2. Woodward Avenue / McKinley Avenue	City of Manteca	Side-Street Stop	NO
7. Atherton Drive / Airport Way	City of Manteca	Side-Street Stop	NO
8. Woodward Avenue / Airport Way	City of Manteca	All-Way Stop	NO
12. Woodward Avenue / Union Road	City of Manteca	All-Way Stop	NO

NOTE:

[1] EVALUATED BASED ON PEAK HOUR VOLUME WARRANT CONTAINED IN CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (CA MUTCD), CALTRANS, 2014.

SOURCE: FEHR & PEERS, 2016.

As shown in the table, the peak hour volume warrant for consideration of a traffic signal is not satisfied for any of the existing study intersections.

In the event that a peak hour volume warrant is satisfied, a detailed evaluation of all applicable warrants should be conducted and additional factors (e.g., congestion, approach conditions, driver confusion) should be considered before the decision to install a signal is made. The peak hour volume warrant (Warrant 3) was evaluated using the available data. Detailed signal warrant assessments are provided in the appendix.

EXISTING FREEWAY OPERATIONS

Table 3.13-6 displays AM and PM peak hour operations of the study freeway segments.

TABLE 3.13-6: FREEWAY OPERATIONS – EXISTING CONDITIONS

INTERSECTION	TYPE	AM PEAK HOUR		PM PEAK HOUR	
		DENSITY	LOS	DENSITY	LOS
1. SR 120 EB between Yosemite Avenue and Airport Way	Mainline	19.6	C	**49.2**	**F**
2. SR 120 EB off-ramp at Airport Way	Diverge	24.1	C	**44.2**	**F**
3. SR 120 EB on-ramp at Airport Way	Merge	23.3	C	**37.6**	**E**
4. SR 120 EB between Airport Way and Union Road	Mainline	20.3	C	**41.2**	**E**
5. SR 120 EB off-ramp at Union Road	Diverge	24.8	C	40.8	D
6. SR 120 EB on-ramp at Union Road	Merge	22.6	C	33.1	D
7. SR 120 WB off-ramp at Union Road	Diverge	**35.2**	**E**	31.5	D
8. SR 120 WB on-ramp at Union Road	Merge	32.1	D	27.7	C
9. SR 120 WB between Union Road and Airport Way	Mainline	31.4	D	25.5	C
10. SR 120 WB off-ramp at Airport Way	Diverge	**35.6**	**E**	30.7	D
11. SR 120 WB on-ramp at Airport Way	Merge	34.0	D	25.9	C
12. SR 120 WB between Airport Way and Yosemite Avenue	Mainline	**35.0**	**E**	23.7	C

NOTE: [1] EVALUATED USING THE HCS2010 SOFTWARE, WHICH APPLIES THE METHODS FROM THE HIGHWAY CAPACITY MANUAL (TRANSPORTATION RESEARCH BOARD, 2010).

SOURCE: FEHR & PEERS, 2016.

As shown in Table 3.13-6, the westbound direction of SR 120 currently operates at LOS E at the Union Road off-ramp, at the Airport Way off-ramp, and between Airport Way and Yosemite Avenue. During the PM peak hour, the eastbound direction of SR 120 currently operates at LOS F between Guthmiller Road/Yosemite Avenue and Airport Way and at the Airport Way off-ramp. Eastbound 120 also currently operates at LOS E at the Airport Way on-ramp and between Airport Way and Union Road. All other study freeway facilities currently operate at LOS D or better during both morning and evening peak hour conditions.

3.13.3 PROJECT TRAVEL CHARACTERISTICS

PROJECT DESCRIPTION

The Project site comprises 258.29 acres of land in the southwestern portion of the City of Manteca city limits. The Project is bounded on the north by an existing dirt roadway between Bronzan Road and Atherton Drive, on the east by South McKinley Avenue and an existing residential subdivision, on the south by existing agricultural fields, and on the west by existing agricultural fields and the future Atherton Drive right-of-way. The proposed Project is a mixed-use development consisting of low density residential, high density residential, general commercial, and public facilities. The Project is intended to provide for local and regional housing and employment opportunities and that take advantage of the area's high level of accessibility.

For analysis purposes, the proposed Project was assumed to consist of the following trip generating land uses:

- 975 low density residential dwelling units
- 290 high density residential dwelling units
- 237,840 square feet of General Commercial

In addition, the proposed Project would construct Atherton Drive as the primary access to the Project site, which would start from its northern terminus at McKinley Avenue to the southern terminus at Woodward Avenue. Atherton Drive would intersect with Bronzan Road and Woodward Avenue, which also enable secondary access to be provided into the residential uses.

According to the Project site plan, access to the proposed Project would be provided by the following six main Project access driveways:

- Atherton Drive / Woodward Avenue
- Atherton Drive / Dutch Harbor Way
- South of Atherton Drive into Multi-Family Residential
- Woodward Avenue / Yukon Avenue
- McKinley Avenue / Denali Drive
- McKinley Avenue / Street B

The above driveways are studied under "Plus Project" scenarios.

TRIP GENERATION

The Project description and expected operating characteristics of the proposed land uses closely match the description of the corresponding land use categories contained in *Trip Generation* (Institute of Transportation Engineers, 2012).

Table 3.13-7 displays the Project's expected AM and PM peak hour trip generation.

TABLE 3.13-7: PROJECT TRIP GENERATION – AM AND PM PEAK HOUR CONDITIONS

LAND USE	ITE LAND USE CODE	UNITS	TRIP RATES[1]		AM PEAK HOUR TRIPS			PM PEAK HOUR TRIPS		
			AM	PM	IN	OUT	TOTAL	IN	OUT	TOTAL
Single Family Residential	210	975 dwelling units	0.75	1.00	183	548	731	614	361	975
Multi-Family Residential	220	290 dwelling units	0.51	0.62	30	118	148	117	63	180
Commercial	820	237.84 KSF	0.96	3.71	142	87	229	424	459	883
Internal Trips					22	22	44	88	88	176
Pass-by and Diverted-Link Trips					0	0	0	110	110	220
Total New External Trips					**333**	**731**	**1,064**	**957**	**685**	**1,642**

NOTES:

[1] TRIP RATES ARE BASED ON THE TRIP GENERATION 9TH EDITION (INSTITUTE OF TRANSPORTATION ENGINEERS, 2012).

KSF = THOUSAND SQUARE FEET

SOURCE: FEHR & PEERS, 2016.

The trip generation table presented above includes a reduction of the Project's gross trip generation (as counted at Project driveways) due to the following trip types:

- Internalized trips – trips generated internal to the Project. Internalized trips do not enter the roadway network outside the Project site.
- Pass-by trips – existing trips using the roadway network that stop at commercial/retail uses. Pass-by trips do not add new trips to the existing roadway network.
- Diverted-link trips – existing trips using the roadway network that make very short diversions (typically from regional travel facilities such as freeways) to visit commercial/retail developments. Diverted-link trips add trips to local roadways but not to regional travel facilities from which they are diverted.

When accounting for the trip types listed above, the Project generates approximately 1,064 new external AM peak hour trips and 1,642 new external PM peak hour trips.

TRIP DISTRIBUTION/ASSIGNMENT

The expected distribution of Project trips onto the adjacent roadway network was determined based on the following analytical techniques:

- The relative proportion of trips by purpose (e.g., residential to retail, residential to office, etc.) and the location of complementary land uses (e.g., employment, shopping, schools, etc.)
- The Project's trip internalization from MXD+
- Project-only traffic assignment using the SJCOG travel demand model. This process consists of adding the proposed Project to the traffic model, rerunning the model, and tracking the number/directionality of Project trips assigned to the surrounding roadway network.
- Review of existing travel patterns for nearby residential and commercial developments

Trip distribution and assignment was analyzed to account for trip patterns of different trip types. The following trip types were analyzed separately and then aggregated to obtain the total Project trip generation under both Existing Plus Project and Cumulative Plus Project conditions.

- Residential trips
- Retail trips
- Pass-by and diverted-link trips (described above)
- Internalized trips (described above)

Figure 3.13-5 shows the expected distribution of Project trips under Existing Plus Project conditions. Of all trips generated by the Project, approximately 50% of residential trips and 45% of retail trips are expected to travel to/from the west on SR 120, while approximately 20 percent are expected to travel to/from the east on SR 120. The remaining trips (30% of residential trips and 35% of retail trips) are expected to travel locally and remain on local roadways.

Figure 3.13-6 shows the expected distribution of Project trips under Cumulative Plus Project conditions. The cumulative distribution is similar to that of existing, but considers planned roadway improvements (e.g., new interchange at McKinley Avenue with SR 120) and new land use developments that may attract Project trips. This figure shows that 45 percent of residential trips and 42 percent of commercial trips are expected to travel to/from the west on SR 120, while 22 percent of residential trips and 19 percent of commercial trips are expected to travel to/from the east on SR 120. Approximately 10 percent of Project trips are expected to travel northerly on McKinley Avenue and Airport Way.

Project trips were assigned to study facilities in accordance with the trip generation and trip distribution described previously. The Project trips were added to existing traffic volumes to yield "Existing Plus Project" conditions, which are shown on Figure 3.13-7.

It should be noted that the new SR 120 interchange at McKinley Avenue would result in a major redistribution of some trips. Trips that would access SR 120 using Airport Way now can access SR 120 using McKinley Avenue. Figure 3.13-8 presents the Cumulative Roadway Network and shows the planned roadway improvements included in the City of Manteca General Plan and SJCOG's Regional Transportation Plan (Tier 1).

Figure 3.13-9 displays the Cumulative No Project AM and PM peak hour traffic volumes at the study intersections. This figure also displays the future traffic controls and lane configurations at each intersection. Project trips were assigned to study facilities in accordance with the trip generation and trip distribution described previously.

The project trips were added to Cumulative No Project traffic volumes to yield "Cumulative Plus Project" conditions, which are shown on Figure 3.13-10.

3.13.4 REGULATORY SETTING

Existing transportation polices, laws, and regulations that would apply to the proposed Project are summarized below. This information provides a context for the impact discussion related to the Project's consistency with applicable regulatory conditions and development of significance criteria for evaluating Project impacts.

FEDERAL AND STATE REGULATIONS

Caltrans is responsible for planning, designing, constructing, operating, and maintaining all state-owned roadways in California. Federal Highway standards are implemented in California by Caltrans. Any improvements or modifications to the state highway system within the City of Manteca need to be approved by Caltrans. The City of Manteca does not have the ability to unilaterally make improvements to the state highway system.

The *State Route 120 Transportation Concept Report – TCR* (Caltrans, 2005) identifies a concept LOS of "D" for the segment of SR 120 from I-5 to SR-99. The TCR identifies the need for widening of this facility to six lanes with an ultimate facility being eight lanes to meet projected travel demands. The TCR identifies interchange upgrades at Yosemite Avenue, McKinley Avenue, Airport Way, Union Road, and Main Street.

LOCAL REGULATIONS

City of Manteca General Plan

POLICIES: LEVEL OF SERVICE

- C-P-1. The City shall strive to balance levels of service (LOS) for all modes (vehicle, transit, bicycle, and pedestrian) to maintain a high level of access and mobility, while developing a complete and efficient circulation system. The impact of new development and land use proposals on LOS and accessibility for all modes should be considered in the review process.
- C-P-2. To the extent feasible, the City shall strive for a vehicular LOS of D or better at all streets and intersections, except in the Downtown area where right-of-way is limited, pedestrian, bicycle, and transit mobility are most important and vehicular LOS is not a consideration. See Figure 4.1 for a map defining the Downtown area. While vehicular LOS

is not a consideration in the Downtown area, traffic studies shall disclose whether any proposed transportation or land use action will substantially increase traffic at intersections and roadways within this area of the City.

- C-P-3. At the discretion of City staff, certain locations may be allowed to fall below the City's LOS standard under the following circumstances:
  a. Where constructing facilities with enough capacity to provide LOS D is found to be unreasonably expensive. This applies to facilities, for example, on which it would cost significantly more per dwelling unit equivalent (DUE) to provide LOS D than is deemed reasonable by City staff.
  b. Where it is difficult or impossible to maintain LOS D because surrounding facilities in other jurisdictions operate at LOS E or worse.
  c. Where maintaining LOS D will be a disincentive to use of existing alternative modes or to the implementation of new transportation modes that would reduce vehicle travel. Examples include roadway or intersection widening areas with substantial pedestrian activity or near major transit centers.
  d. In the Downtown area the City cannot maintain the vehicular LOS D standard because of the historic nature of development and limited street right-of-way. However, it is the City's goal to maintain high quality access and mobility in the area with a priority toward non-auto modes. Therefore, the City shall require that new discretionary land use action within the Downtown area, which generate net new PM peak hour auto trips, to participate in enhancing access and mobility for transit, bicycle, and pedestrian modes. These enhancements may include but are not limited to:
     - Enhancing sidewalks to create a high quality pedestrian environment, including wider sidewalks and improved crosswalks, landscaping, buffers between sidewalks and vehicle travel lanes, enhanced pedestrian lighting, increased availability of benches, provisions for café-style seating, and usage of monument elements and other public art.
     - Improving bicycle facilities to include attractive and secure bicycle parking, installation of bike lockers in appropriate locations, and provision of bicycle lanes along appropriate roadways.
     - Enhancing transit stops through high quality, well maintained shelters, and provision of wayfinding signage and transit timetables.
     - Providing off-street parking with high quality access to Downtown businesses, and which is well-maintained and provides amenities like shade streets, canopies, adequate lighting, and wayfinding signage.
     - Supporting the development of a Downtown Business Improvement District or similar mechanism to help fund ongoing maintenance of the streetscape enhancements.

POLICIES: STREET SYSTEM

- C-P-5. Major circulation improvements shall be completed as abutting lands develop or redevelop, with dedication of right-of-way and construction of improvements, or participation in construction of such improvements, required as a condition of approval.
- C-P-6. New development shall pay a fair share of the costs of street and other transportation improvements based on impacts to LOS and other modes in conformance with the goals and policies established in this Circulation Element and the PFF program.

POLICIES: BIKEWAYS AND PEDESTRIAN FACILITIES

- C-P-29. Through regular updates to the City's Bicycle Master Plan, the City shall establish a safe and convenient network of identified bicycle routes connecting residential areas with recreation, shopping, and employment areas within the city. The City shall also strive to develop connections with existing and planned regional routes shown in the San Joaquin County Bicycle Master Plan.
- C-P-30. Provide adequate bicycle parking facilities at commercial, business / professional and light industrial users.
- C-P-36. City shall strive to provide a sidewalk system that serves all members of the community and meets the latest guidelines related to the Americans with Disabilities Act (ADA).
- C-P-40. Provide sidewalks along all new streets in the City.

City of Lathrop General Plan

The City of Lathrop General Plan (partial amendment in November 2004) contains various transportation-related goals and policies that are relevant to the proposed Project because of the proximity of the Project site to Lathrop, and because of the roadway connectivity. The City General Plan includes proposed improvements to existing expressways and arterial streets in Lathrop east of I-5. These improvements would allow east-west traffic to access I-5 by traveling around the existing developed area of Lathrop. This would reduce traffic impacts on the Lathrop Road and Louise Avenue interchanges and on freeway sections between Roth Road on the north and the I-5/SR 120 merge on the south. The following improvements within the study area were identified:

- Improve Airport Way to six lanes from Roth Road to SR 120.
- Improve Yosemite Avenue to six lanes from SR 120 to the Manteca City limits.

The City's General Plan identifies LOS C operations on City streets and LOS D operations at interchange ramps.

San Joaquin County Regional Transportation Plan

In June 2014, SJCOG adopted the *2014 Regional Transportation Plan / Sustainable Communities Strategy (RTP/SCS*). This document outlines countywide transportation expenditures based on funding from sources like the federal government, the State of California, and locally collected funds. The RTP contains several proposed improvements that would benefit the regional roadway network within the study area. The improvements, which are listed in Table 3.13-8, are in the Tier 1 category, meaning they have programmed funding sources.

TABLE 3.13-8: STATUS OF PLANNED IMPROVEMENTS IN STUDY AREA

PROJECT	*INCLUDED IN TIER I LIST IN 2014 RTP/SCS?*	*INCLUDED IN MEASURE K?*	*INCLUDED IN RTIF?*
SR 120 Widening – 4 to 6 lanes from I-5 to SR 99	Yes	Yes	Yes
New SR 120/McKinley interchange	Yes	Yes	Yes
Upgrade SR 120/Union Road interchange	Yes	Yes	No
Airport Way Widening – 2 to 4 lanes from SR 120 to Lathrop Road	Yes	Yes	Yes
Raymus Expressway – 2 to 6 lane expressway from SR 120 to SR 99	Yes	No	Yes

SOURCE: FEHR & PEERS, 2016.

San Joaquin County Congestion Management Plan

SJCOG operates a Regional Congestion Management Program (RCMP), which monitors cumulative transportation impacts of growth on the regional roadway system, identifies deficient roadways, and develops plans to mitigate the deficiencies. The RCMP considers LOS E or F operations to be deficient and includes segments of SR 120 and Airport Way (north of SR 120) as CMP facilities.

San Joaquin County Regional Traffic Impact Fee (RTIF)

SJCOG has implemented a regional traffic impact fee that is assessed on new developments throughout San Joaquin County. The RTIF capital project list provides funding for various freeway and local road widening (project list found at: http://www.sanjoaquincountytimf.com). The RTIF capital project began in 2005, and has generated nearly $30 million in funding for project delivery. For fiscal year 2012 (per: http://www.sjcog.org/AgendaCenter/ViewFile/Agenda/01102013-166), the fee schedule for new residential development is approximately $2,987 for single-family units and $1,792 for multi-family units. RTIF funds are expended on regionally significant capital improvements. Table 3.13-8 lists those projects included in this fee program within the study area.

Measure K

Measure K is the half-cent sales tax dedicated to transportation projects in San Joaquin County. Measure K was passed in November 1990, and began collecting funds for a system of improved highways and local streets, new passenger rail service, regional and inter-regional bus routes, park-and-ride lots, new bicycle facilities, and railroad crossings. On November 7, 2006, San

Joaquin County voters decided to extend Measure K for an additional 30 years. The renewal of Measure K is estimated to generate $2.552 billion for the transportation programs identified in the Measure K Expenditure Plan. Table 3.13-8 lists those projects included in this fee program within the study area.

City of Manteca Public Facilities Implementation Plan

The City of Manteca is in the midst of updating the Public Facilities Implementation Plan (PFIP). The PFIP is a fee program which collects fees from new development to finance capacity expansion of public facilities (i.e., water, sewer collection, drainage, and transportation) necessary to accommodate the new demands. The City's draft PFIP includes a variety of roadway widenings or extensions such as Airport Way, Atherton Drive, McKinley Avenue, and other roadways within the City. It also includes various intersection improvements.

3.13.5 THRESHOLDS OF SIGNIFICANCE

This section describes the thresholds or criteria that determine whether the Project causes a significant impact on the roadway, bicycle, pedestrian, rail and/or transit systems. These thresholds are based on policies from the General Plans of Manteca and Lathrop, Caltrans policies, and Appendix G of the CEQA Guidelines (2013). For the purposes of this Draft EIR, the Project would cause a significant impact if it would:

Signalized Intersections

a) Worsen operations maintained by Manteca or Caltrans from LOS D or better to LOS E or worse.
b) Increase the average delay by three (3) seconds or more at a signalized intersection in Manteca currently operating (or projected to operate) at LOS E or worse.
c) Add traffic to a signalized intersection on a Caltrans facility that is currently operating (or projected to operate) at LOS E or worse.
d) Worsen the LOS at an intersection in Lathrop from LOS C or better to LOS D or worse;
e) Increase the average delay at an intersection in Lathrop currently operating (or projected to operate) at LOS D or worse by five (5) seconds or more.

All-Way Stop Intersections

a) Worsen operations at an intersection in Manteca from LOS D or better to LOS E or F, and cause the peak hour volume signal warrant to be met.
b) Increase the average delay by three (3) seconds or more at an intersection in Manteca currently operating (or projected to operate) at LOS E or worse and cause the peak hour volume signal warrant to be met.
c) Add traffic to an unsignalized intersection on a Caltrans facility that is currently operating (or projected to operate) at LOS E or worse and cause the peak hour volume signal warrant to be met.

d) Worsen the LOS at an intersection in Lathrop from LOS C or better to LOS D or worse;
e) Increase the average delay at an intersection in Lathrop currently operating (or projected to operate) at LOS D or worse by five (5) seconds or more;

Side-Street Stop Intersections

a) Worsen operations (for the highest delayed side-street movement) at an intersection in Manteca from LOS D or better to LOS E or F, and cause the peak hour volume signal warrant to be met.
b) Increase the average delay for the highest delayed side-street movement at an intersection in Manteca currently operating (or projected to operate) unacceptably by three seconds or more and cause one of the peak hour signal warrants to be met.
c) Add traffic to a side-street stop intersection on a Caltrans facility that is currently operating (or projected to operate) at LOS E or worse and cause the peak hour volume signal warrant to be met.

Freeway Facilities

a) Worsen operations from LOS D or better to LOS E or F.
b) Add 100 vehicles per day or more to a freeway segment that is currently operating (or projected to operate) unacceptably.
c) Increase traffic by one percent or more at a freeway ramp that is currently operating (or projected to operate) unacceptably.
d) Cause vehicular queues on a freeway off-ramp to spill back to the freeway mainline.

Transit System

a) Disrupt or interfere with existing or planned public transit services or facilities.
b) Create an inconsistency with policies concerning transit systems set forth in a General Plan or other adopted policy document.

Bicycle/Pedestrian System

a) Disrupt or interfere with existing or planned bicycle/pedestrian facilities.
b) Result in unsafe conditions for pedestrians, including unsafe pedestrian/bicycle or pedestrian/vehicle conflicts.
c) Result in unsafe conditions for bicycles, including unsafe bicycle/pedestrian or bicycle/vehicle conflicts.
d) Create an inconsistency with policies related to bicycle or pedestrian systems set forth in a General Plan or other adopted policy document.

At-Grade Railroad Crossings

a) Cause motorists to incur delays corresponding to LOS E or F conditions due to preemptions caused by train crossings.

b) Add traffic to an at-grade railroad crossing that has a demonstrated record of having an above-average rate of accidents.

3.13.6 IMPACTS AND MITIGATION MEASURES

EXISTING PLUS PROJECT TRAFFIC IMPACT ANALYSIS

An Existing Plus Project analysis was performed to identify potential impacts under existing conditions. This scenario focuses on the Project-specific effects of the Project. Existing Plus Project operations were analyzed for the weekday AM and PM peak hours at the study intersections. Table 3.13-9 displays the intersection analysis results.

The data in this table indicates that the addition of Project trips would unacceptably degrade operations at the following four study intersections:

- Intersection #1 - Yosemite Avenue / McKinley Avenue all-way stop controlled intersection from LOS B to LOS E during the PM peak hour;
- Intersection #6 - SR 120 Eastbound Ramps / Airport Way signalized intersection from LOS C to LOS F during the PM peak hour;
- Intersection #7 - Atherton Drive / Airport Way side-street stop controlled intersection would worsen operations by more than three seconds or more under both the AM and PM peak hours;
- Intersection #8 - Woodward Avenue / Airport Way all-way stop controlled intersection from LOS B to LOS E during both the AM and PM peak hours; and
- Intersection #16 - Atherton Drive / Dutch Harbor Way / Commercial Driveway (new side-street stop controlled intersection) would operate at LOS F during the PM peak hour.

Traffic signal warrant analyses were prepared for the Existing Plus Project scenario. The results are shown in Table 3.13-10. Detailed signal warrant assessments are provided in Appendix 3.13-10 of Appendix E. As displayed below, the Project would cause all existing unsignalized intersections to meet the peak hour volume traffic signal warrant. Of Project-only intersections, only the intersections of McKinley Avenue / Atherton Drive and Atherton Drive / Dutch Harbor Way would meet the peak hour volume traffic signal warrant.

TABLE 3.13-9: INTERSECTION OPERATIONS – EXISTING PLUS PROJECT CONDITIONS

INTERSECTION	JURISDICTION	TRAFFIC CONTROL	PEAK HOUR	EXISTING		EXISTING PLUS PROJECT	
				DELAY[1] (SEC/VEH)	LOS	DELAY[1] (SEC/VEH)	LOS
1. Yosemite Avenue / McKinley Avenue	City of Lathrop	AWSC	AM	12	B	16	C
			PM	17	C	**47**	**E**
2. Woodward Avenue / McKinley Avenue	City of Manteca	SSSC, AWSC	AM	3 (10)	A (B)	14	B
			PM	4 (11)	A (B)	27	D
3. Yosemite Avenue / Airport Way	City of Manteca	Signal	AM	21	C	20	B
			PM	35	D	35	C
4. Daniels Street / Airport Way	City of Manteca	Signal	AM	15	B	15	B
			PM	23	C	24	C
5. SR 120 Westbound Ramps / Airport Way	Caltrans	Signal	AM	9	A	19	B
			PM	12	B	40	D
6. SR 120 Eastbound Ramps / Airport Way	Caltrans	Signal	AM	10	B	17	B
			PM	31	C	**82**	**F**
7. Atherton Drive / Airport Way	City of Manteca	SSSC	AM	18 (97)	C (F)	**463 (2002)**	**F (F)**
			PM	10 (76)	A (F)	**473 (2248)**	**F (F)**
8. Woodward Avenue / Airport Way	City of Manteca	AWSC	AM	12	B	**41**	**E**
			PM	15	B	**47**	**E**
9. SR 120 Westbound Ramps / Union Road	Caltrans	Signal	AM	9	A	9	A
			PM	11	B	13	B
10. SR 120 Eastbound Ramps / Union Road	Caltrans	Signal	AM	13	B	13	B
			PM	20	C	23	C
11. Atherton Drive / Union Road	City of Manteca	Signal	AM	2	A	2	A
			PM	3	A	3	A
12. Woodward Avenue / Union Road	City of Manteca	AWSC	AM	12	B	13	B
			PM	20	C	23	C
13. Atherton Drive / McKinley Avenue	City of Manteca	AWSC	AM	-	-	12	B
			PM	-	-	18	C
14. Atherton Drive - Joshua Street / Woodward Avenue	City of Manteca	AWSC	AM	-	-	9	A
			PM	-	-	10	A
15. Atherton Drive / Multi-Family Driveway	City of Manteca	SSSC	AM	-	-	5 (10)	A (A)
			PM	-	-	3 (9)	A (A)
16. Atherton Drive / Dutch Harbor Way - Commercial Driveway	City of Manteca	SSSC	AM	-	-	5 (15)	A (C)
			PM	-	-	**251 (754)**	**F (F)**
17. Woodward Avenue / Yukon Avenue - Street "A"	City of Manteca	SSSC	AM	-	-	4 (15)	A (C)
			PM	-	-	3 (18)	A (C)
18. McKinley Avenue / Denali Drive	City of Manteca	SSSC	AM	-	-	2 (12)	A (B)
			PM	-	-	2 (15)	A (B)
19. McKinley Avenue / Street "B"	City of Manteca	AWSC	AM	-	-	8	A
			PM	-	-	8	A

NOTES:

1. *FOR SIGNALIZED AND ALL-WAY STOP CONTROLLED INTERSECTIONS, AVERAGE INTERSECTION DELAY IS REPORTED IN SECONDS PER VEHICLE FOR ALL APPROACHES. FOR SIDE-STREET STOP CONTROLLED INTERSECTIONS, THE DELAY AND LOS FOR THE MOST-DELAYED INDIVIDUAL MOVEMENT IS SHOWN IN PARENTHESES NEXT TO THE AVERAGE INTERSECTION DELAY AND LOS. ALL RESULTS ARE ROUNDED TO THE NEAREST SECOND.*

AWSC = ALL-WAY STOP CONTROL; SSSC = SIDE-STREET STOP CONTROL. ***BOLD*** *REPRESENTS UNACCEPTABLE OPERATIONS.* ***BOLD AND UNDERLINED*** *REPRESENTS SIGNIFICANT IMPACTS.*

SOURCE: FEHR & PEERS, 2016.

TABLE 3.13-10: PEAK HOUR SIGNAL WARRANT ANALYSIS – EXISTING PLUS PROJECT CONDITIONS

INTERSECTION	*JURISDICTION*	*TRAFFIC CONTROL*	*EXISTING PEAK HOUR WARRANT MET?* [1]	*EXISTING PLUS PROJECT PEAK HOUR WARRANT MET?* [1]
1. Yosemite Avenue / McKinley Avenue	City of Lathrop	All-Way Stop	NO	YES
2. McKinley Avenue / Woodward Avenue	City of Manteca	All-Way Stop	NO	YES
7. Atherton Drive / Airport Way	City of Manteca	Side-Street Stop	NO	YES
8. Woodward Avenue / Airport Way	City of Manteca	All-Way Stop	NO	YES
12. Woodward Avenue / Union Road	City of Manteca	All-Way Stop	NO	YES
13. McKinley Avenue / Atherton Drive	City of Manteca	All-Way Stop	-	YES
14. Atherton Drive / Woodward Avenue	City of Manteca	All-Way Stop	-	NO
15. Atherton Drive / Multi-Family Driveway	City of Manteca	Side-Street Stop	-	NO
16. Atherton Drive / Dutch Harbor Way	City of Manteca	Side-Street Stop	-	YES
17. Woodward Avenue / Yukon Avenue	City of Manteca	Side-Street Stop	-	NO
18. McKinley Avenue / Denali Drive	City of Manteca	Side-Street Stop	-	NO
19. McKinley Avenue / Street B	City of Manteca	All-Way Stop	-	NO

NOTE:

1. *EVALUATED BASED ON PEAK HOUR VOLUME WARRANT CONTAINED IN CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (CA MUTCD), CALTRANS, 2014.*

SOURCE: FEHR & PEERS, 2016

Table 3.13-11 displays AM and PM peak hour operations of the study freeway segments. The Project would add traffic to segments of SR 120 and result in degradation of traffic operations at the following study freeway locations:

- Eastbound SR 120 between Yosemite Avenue and Airport Way during the PM peak hour would worsen LOS F operations from density of 49.2 to 61.5;
- Eastbound SR 120 Airport Way off-ramp during the PM peak hour would worsen LOS F operations from density of 44.2 to 47.7;
- Eastbound SR 120 Airport Way on-ramp during the PM peak hour would worsen LOS E operations from density of 37.6 to 38.8;
- Eastbound SR 120 between Airport Way and Union Road during the PM peak hour would worsen LOS E operations from density of 41.2 to 44.5;
- Eastbound SR 120 Union Road off-ramp during the PM peak hour would worsen from LOS D (density of 40.8) to LOS E (density of 42.4);
- Westbound SR 120 Union Road off-ramp during the AM peak hour would worsen LOS E operations from density of 35.2 to 35.9;

- Westbound SR 120 Airport Way off-ramp during the AM peak hour would worsen LOS E operations from density of 35.6 to 36.3;
- Westbound SR 120 Airport Way on-ramp during the AM peak hour would worsen operations from LOS D (density of 34.0) to LOS E (density of 36.4); and
- Westbound SR 120 between Airport Way and Yosemite Avenue during the AM peak hour would worsen LOS E operations from density of 35.0 to 40.3.

TABLE 3.13-11: FREEWAY OPERATIONS – EXISTING PLUS PROJECT CONDITIONS

INTERSECTION	*TYPE*	*PEAK HOUR*	*EXISTING CONDITIONS*		*EXISTING PLUS PROJECT CONDITIONS*	
			DENSITY	*LOS*	*DENSITY*	*LOS*
1. SR 120 EB between Yosemite Avenue and Airport Way	Mainline	AM	19.6	C	20.6	C
		PM	**49.2**	**F**	**61.5**	**F**
2. SR 120 EB off-ramp at Airport Way	Diverge	AM	24.1	C	25.3	C
		PM	**44.2**	**F**	**47.7**	**F**
3. SR 120 EB on-ramp at Airport Way	Merge	AM	23.3	C	24.5	C
		PM	**37.6**	**E**	**38.8**	**E**
4. SR 120 EB between Airport Way and Union Road	Mainline	AM	20.3	C	21.7	C
		PM	**41.2**	**E**	**44.5**	**E**
5. SR 120 EB off-ramp at Union Road	Diverge	AM	24.8	C	26.3	C
		PM	40.8	D	**42.2**	**E**
6. SR 120 EB on-ramp at Union Road	Merge	AM	22.6	C	24.0	C
		PM	33.1	D	34.4	D
7. SR 120 WB off-ramp at Union Road	Diverge	AM	**35.2**	**E**	**35.9**	**E**
		PM	31.5	D	33.6	D
8. SR 120 WB on-ramp at Union Road	Merge	AM	32.1	D	32.8	D
		PM	27.7	C	29.6	D
9. SR 120 WB between Union Road and Airport Way	Mainline	AM	31.4	D	32.4	D
		PM	25.5	C	27.7	D
10. SR 120 WB off-ramp at Airport Way	Diverge	AM	**35.6**	**E**	**36.3**	**E**
		PM	30.7	D	32.8	D
11. SR 120 WB on-ramp at Airport Way	Merge	AM	34.0	D	**36.4**	**E**
		PM	25.9	C	27.8	C
12. SR 120 WB between Airport Way and Yosemite Avenue	Mainline	AM	**35.0**	**E**	**40.3**	**E**
		PM	23.7	C	26.1	D

NOTE: EVALUATED USING THE HCS2010 SOFTWARE, WHICH APPLIES THE METHODS FROM THE HIGHWAY CAPACITY MANUAL (TRANSPORTATION RESEARCH BOARD, 2010).
SOURCE: FEHR & PEERS, 2016.

Impact 3.13-1: The proposed Project would result in a significant impact at the Yosemite Avenue / McKinley Avenue intersection. (Significant and Unavoidable in the Short-Term, Less Than Significant in the Long-Term)

The Project would cause significant impacts to the Yosemite Avenue / McKinley Avenue intersection, which is an all-way stop controlled intersection in the City of Lathrop. The Yosemite Avenue / McKinley Avenue intersection currently operates at LOS C with 17 seconds of delay in the PM peak hour. The addition of Project-generated traffic would result in the intersection's operations to decline to LOS E with 47 seconds of delay. The following measure has been identified to improve intersection operations to LOS C or better:

- Signalize intersection

However, the City of Lathrop would be responsible for the intersection improvement, acquisition of right-of-way, and construction; therefore, based on the significance criteria this impact is considered **significant and unavoidable** in the short-term until the planned improvements are completed, and **less than significant** once the improvements are in place.

Impact 3.13-2: The proposed Project would result in a significant impact at the Atherton Drive / Airport Way intersection. (Significant and Unavoidable in the Short-Term, Less Than Significant in the Long-Term)

The Project would cause significant impacts to the Atherton Drive / Airport Way intersection, which is a side-street stop controlled intersection in the City of Manteca. The Atherton Drive / Airport Way intersection currently operates at LOS F during the AM and PM peak hours with a worst-case movement delay of 97 and 76 seconds, respectively. The addition of Project traffic would deteriorate LOS F operations further, resulting in a worst-case movement delay of more than 10 minutes during the AM and PM peak hours.

This study intersection is under City of Manteca jurisdiction and is included in the City's PFIP. The following short-term improvements are necessary for the intersection to operate acceptably:

- Signalize intersection; and
- Restripe intersection to include a single left turn lane, through lane, and right turn lane on the eastbound and westbound approaches.

The City of Manteca would be responsible for the intersection improvement, acquisition of right-of-way, and construction; therefore, based on the significance criteria this impact is considered **significant and unavoidable** in the short-term until the planned improvements are complete. The Project applicant would be required to pay their fair share fee towards the intersection improvements, as required by Mitigation Measure 3.13-1. It is noted that this impact would be reduced to **less than significant** once these improvements are in place.

MITIGATION MEASURE(S)

Mitigation Measure 3.13-1: *Prior to issuance of building permits for each phase of the Project, the Project applicant shall pay their proportionate fair share cost to signalize and restripe the Atherton Drive / Airport Way intersection. If the aforementioned improvements are specifically included in the transportation PFIP, then the Project applicant shall contribute their proportionate fair share funding by paying the transportation PFIP fee due at building permit issuance.*

Impact 3.13-3: The proposed Project would result in a significant impact at the Woodward Avenue / Airport Way intersection. (Significant and Unavoidable in the Short-Term, Less Than Significant in the Long-Term)

The Project would cause significant impacts to the Woodward Avenue / Airport Way intersection, which is an all-way stop controlled intersection in the City of Manteca. The Woodward Avenue / Airport Way intersection currently operates at LOS B during the AM and PM peak hours with an average intersection delay of 12 and 15 seconds, respectively. The addition of Project traffic would deteriorate intersection operations to LOS E, resulting in an average intersection delay of 41 and 47 seconds during the AM and PM peak hours, respectively.

This study intersection is under City of Manteca jurisdiction and is included in the City's PFIP. The following short-term improvements are necessary for the intersection to operate acceptably:

- Construct an eastbound left-turn lane; and
- Construct a southbound right-turn lane.

The City of Manteca would be responsible for the intersection improvement, acquisition of right-of-way, and construction; therefore, based on the significance criteria this impact is considered **significant and unavoidable** in the short-term until the planned improvements are complete. The Project applicant would be required to pay their fair share fee towards the intersection improvements, as required by Mitigation Measure 3.13-2. It is noted that this impact would be reduced to **less than significant** once these improvements are in place.

MITIGATION MEASURE(S)

Mitigation Measure 3.13-2: *Prior to issuance of building permits for each phase of the Project, the Project applicant shall pay their proportionate fair share cost to construct an eastbound left-turn lane and a southbound right-turn lane at the Woodward Avenue / Airport Way intersection. If the aforementioned improvements are specifically included in the transportation PFIP, then the Project applicant shall contribute their proportionate fair share funding by paying the transportation PFIP fee due at building permit issuance.*

Impact 3.13-4: The proposed Project would result in increased delay at the Eastbound SR 120 Ramps / Airport Way intersection. (Less Than Significant with Mitigation)

The Project would result in increased delay at the Eastbound SR 120 Ramps / Airport Way intersection. The Eastbound SR 120 Ramps / Airport Way intersection currently operates at LOS C with 31 seconds of delay during the PM peak hour. The addition of Project traffic would degrade intersection operations to LOS F with 82 seconds of delay.

Signal timing adjustments at the intersection would improve operations to acceptable LOS D with 55 seconds of delay. Mitigation Measure 3.13-3 requires the Project applicant to coordinate with the City to ensure adjustments to the signal timing at this intersection are made, once warranted. Therefore, based on the significance criteria and with implementation of Mitigation Measure 3.13-3, this impact is considered **less than significant**.

MITIGATION MEASURE(S)

Mitigation Measure 3.13-3: *Prior to the issuance of final occupancy of the first unit past 33% of total units, the Project applicant shall coordinate with the City to ensure that appropriate signal timing adjustments are made to the Eastbound SR 120 Ramps / Airport Way intersection once traffic volumes warrant such.*

Impact 3.13-5: The proposed Project would result in a significant impact at the Atherton Drive / Dutch Harbor Way / Commercial Driveway intersection. (Less Than Significant with Mitigation)

The Project would cause significant impacts to the Atherton Drive / Dutch Harbor Way / Commercial Driveway intersection, which is an all-way stop controlled intersection in the City of Manteca. The addition of Project-generated traffic to the Atherton Drive / Dutch Harbor Way / Commercial Driveway intersection would result in the intersection to operate at LOS F with 251 seconds of delay during the PM peak hour.

This study intersection is under City of Manteca jurisdiction. The following measures have been identified to improve intersection operations from unacceptable LOS F with 251 seconds of delay to acceptable LOS D with 42 seconds of delay during the PM peak hour:

- Signalize the intersection;
- Construct an eastbound left-turn lane; and
- Construct a southbound left-turn lane in addition to a shared through/right lane.

The Project applicant would be responsible for the intersection improvement, acquisition of right-of-way, and construction. Construction of the aforementioned improvements would result in an acceptable delay at the Atherton Drive / Dutch Harbor Way / Commercial Driveway intersection. Therefore, based on the significance criteria and with implementation of Mitigation Measure 3.13-

4, this impact is considered **less than significant**. Table 3.13-12 shows the resulting delay and LOS with implementation of Mitigation Measure 3.13-4.

MITIGATION MEASURE(S)

Mitigation Measure 3.13-4: *Prior to issuance of building permits for each phase of the Project, the Project applicant shall pay for and construct the following improvements at the Atherton Drive / Dutch Harbor Way / Commercial Driveway intersection:*

- *Signalize the intersection;*
- *Construct an eastbound left-turn lane; and*
- *Construct a southbound left-turn lane in addition to a shared through/right lane.*

TABLE 3.13-12: INTERSECTION OPERATIONS – EXISTING PLUS PROJECT CONDITIONS WITH MITIGATION

INTERSECTION	*JURISDICTION*	*TRAFFIC CONTROL*	*PEAK HOUR*	*EXISTING PLUS PROJECT*		*EXISTING PLUS PROJECT WITH MITIGATION*	
				DELAY[1] (SEC/VEH)	*LOS*	*DELAY[1] (SEC/VEH)*	*LOS*
1. Yosemite Avenue / McKinley Avenue	City of Lathrop	Signal	AM	16	C	6	A
			PM	**47**	**E**	8	A
6. SR 120 Eastbound Ramps / Airport Way	Caltrans	Signal	AM	17	B	14	B
			PM	**82**	**F**	55	D
7. Atherton Drive / Airport Way	City of Manteca	Signal	AM	**463 (2002)**	**F (F)**	38	D
			PM	**473 (2248)**	**F (F)**	34	C
8. Woodward Avenue / Airport Way	City of Manteca	AWSC	AM	**41**	**E**	31	D
			PM	**47**	**E**	33	D
16. Atherton Drive / Dutch Harbor Way / Commercial Driveway	City of Manteca	Signal	AM	5 (15)	A (C)	15	B
			PM	**251 (754)**	**F (F)**	42	D

NOTE:

1. *FOR SIGNALIZED AND ALL-WAY STOP CONTROLLED INTERSECTIONS, AVERAGE INTERSECTION DELAY IS REPORTED IN SECONDS PER VEHICLE FOR ALL APPROACHES. FOR SIDE-STREET STOP CONTROLLED INTERSECTIONS, THE DELAY AND LOS FOR THE MOST-DELAYED INDIVIDUAL MOVEMENT IS SHOWN IN PARENTHESES NEXT TO THE AVERAGE INTERSECTION DELAY AND LOS. ALL RESULTS ARE ROUNDED TO THE NEAREST SECOND.*
2. *AWSC = ALL-WAY STOP CONTROL; SSSC = SIDE-STREET STOP CONTROL.* ***BOLD*** *REPRESENTS UNACCEPTABLE OPERATIONS.* ***BOLD AND UNDERLINED*** *REPRESENTS SIGNIFICANT IMPACTS.*

SOURCE: FEHR & PEERS, 2016.

Impact 3.13-6: The proposed Project would result in a significant impact to freeway facilities. (Significant and Unavoidable in the Short-Term, Less Than Significant in the Long-Term)

The addition of Project generated traffic would result in unacceptable (i.e., LOS E) AM peak hour or PM peak hour operations on the following freeway facilities:

- Eastbound SR 120 mainline between Yosemite Avenue and Airport Way (PM Peak Hour);
- Eastbound SR 120 off-ramp diverge at Airport Way (PM Peak Hour);
- Eastbound SR 120 on-ramp merge at Airport Way (PM Peak Hour);

- Eastbound SR 120 from Airport Way to Union Road (PM Peak Hour);
- Eastbound SR 120 off-ramp diverge at Union Road (PM Peak Hour);
- Westbound SR 120 off-ramp diverge at Union Road (AM Peak Hour);
- Westbound SR 120 off-ramp diverge at Airport Way (AM Peak Hour);
- Westbound SR 120 on-ramp merge at Airport Way (AM Peak Hour); and
- Westbound SR 120 mainline between Airport Way and Yosemite Avenue (AM Peak Hour).

Project traffic would add more than 300 vehicles during the AM peak hour and more than 400 vehicles per hour during the PM peak hour to impacted segments of the SR 120 mainline, and would result in an increase in off-ramp volumes of approximately 40 percent at these locations. Degradation of freeway operations at the above study segments would be considered potentially significant.

A new interchange on SR 120 at McKinley Avenue is undergoing design by the City of Manteca and Caltrans District 10. The new SR 120 / McKinley Avenue interchange is included as a Tier 1 (Funded) project in the adopted 2014-2040 SJCOG 2014 RTP/SCS with an open to traffic date of 2021. Similarly, improvements are planned at the SR 120 / Union Road interchange which, according to the 2014-2040 SJCOG 2014 RTP/SCS, should be improved by the end of 2018.

These improvements include new auxiliary lanes (weave sections) on portions of SR 120, acceleration/deceleration lanes, and two-lane off-ramps to better accommodate travel in the corridor. The effectiveness of the planned improvements was analyzed under Existing Plus Project condition. The results are shown in Table 3.13-13.

The results in Table 3.13-13 indicate that all study segments would improve from unacceptable LOS E to acceptable LOS D or better conditions. This impact is considered **significant and unavoidable** in the short-term until the planned improvements are completed. The Project applicant would be required to pay their fair share fee towards the intersection improvement, as required by Mitigation Measure 3.13-5. It is noted that this impact would be reduced to **less than significant** once these improvements are in place.

MITIGATION MEASURE(S)

Mitigation Measure 3.13-5: *Prior to issuance of building permits for each phase of the Project, the Project applicant shall contribute the appropriate San Joaquin Regional Traffic Impact Fee (RTIF) to cover their proportionate cost of the improvements to the affected freeway facilities in order to satisfy their fair share obligation.*

TABLE 3.13-13: FREEWAY OPERATIONS – EXISTING PLUS PROJECT CONDITIONS WITH MITIGATION

INTERSECTION	*TYPE*	*PEAK HOUR*	*EXISTING PLUS PROJECT CONDITIONS*		*EXISTING PLUS PROJECT WITH MITIGATION*	
			DENSITY	*LOS*	*DENSITY*	*LOS*
1. SR 120 EB between Yosemite Avenue and Airport Way	Mainline	AM	20.6	C	13.8	B
		PM	**61.5**	**F**	27.9	D
2. SR 120 EB off-ramp at Airport Way	Diverge	AM	25.3	C	18.9	B
		PM	**47.7**	**F**	32.8	D
3. SR 120 EB on-ramp at Airport Way	Merge	AM	24.5	C	17.3	B
		PM	**38.8**	**E**	27.8	C
4. SR 120 EB between Airport Way and Union Road	Mainline	AM	21.7	C	14.5	B
		PM	**44.5**	**E**	24.1	C
5. SR 120 EB off-ramp at Union Road	Diverge	AM	26.3	C	20.1	C
		PM	**42.2**	**E**	31.5	D
6. SR 120 EB on-ramp at Union Road	Merge	AM	24.0	C	16.4	B
		PM	34.4	D	24.0	C
7. SR 120 WB off-ramp at Union Road	Diverge	AM	**35.9**	**E**	29.2	D
		PM	33.6	D	27.3	C
8. SR 120 WB on-ramp at Union Road	Merge	AM	32.8	D	21.9	C
		PM	29.6	D	20.4	C
9. SR 120 WB between Union Road and Airport Way	Mainline	AM	32.4	D	20.1	C
		PM	27.7	D	18.0	B
10. SR 120 WB off-ramp at Airport Way	Diverge	AM	**36.3**	**E**	27.2	C
		PM	32.8	D	25.5	C
11. SR 120 WB on-ramp at Airport Way	Merge	AM	**36.4**	**E**	25.4	C
		PM	27.8	C	19.4	B
12. SR 120 WB between Airport Way and Yosemite Avenue	Mainline	AM	**40.3**	**E**	22.9	C
		PM	26.1	D	17.1	B

NOTES: EVALUATED USING THE HCS2010 SOFTWARE, WHICH APPLIES THE METHODS FROM THE HIGHWAY CAPACITY MANUAL (TRANSPORTATION RESEARCH BOARD, 2010). ***BOLD*** *REPRESENTS UNACCEPTABLE OPERATIONS.*
SOURCE: FEHR & PEERS, 2016.

Impact 3.13-7: The proposed Project would adversely affect pedestrian and bicycle facilities. (Less than Significant with Mitigation)

The Project would provide sidewalks and bicycle lanes in conjunction with the design of the vehicular circulation to offer a safe, aesthetic, and preferred alternative to reliance on the automobile. The Project, however, does not specify the location of planned bicycle and pedestrian facilities. The Project should ensure consistency with the *City of Manteca Bicycle Master Plan* (2003), which specifies that a Class I bicycle path is planned along Atherton Drive through the Project site and along McKinley Avenue north of Atherton Drive. Because the Project site plans do not describe any planned bicycle facilities, the Project could create an inconsistency with policies related to bicycle systems. Therefore, this impact is considered potentially significant. Mitigation

Measure 3.13-6 requires the Project applicant to provide bike and pedestrian paths consistent with the City's Bicycle Master Plan. Therefore, with implementation of the following mitigation, the proposed Project would have a **less than significant** impact.

MITIGATION MEASURE(S)

Mitigation Measure 3.13-6: *The Project applicant shall provide a Class I Bike Path along Atherton Drive through the Project site and along McKinley Avenue north of Atherton Drive in order to be consistent with the City of Manteca Bicycle Master Plan. The improvements shall be reflected on the Improvement Plans for the Project.*

Impact 3.13-8: The proposed Project would significantly impact transit services or facilities. (Less than Significant with Mitigation)

The proposed Project includes 975 single-family residential dwelling units, 290 multi-family residential dwelling units, and over 200,000 square feet of commercial space that could potentially increase transit ridership on Manteca Transit Bus Routes 1, 2, and 3. This increase in transit ridership would potentially impact a stop on Daniels Street, located approximately two miles from the Project site. A typical walkshed to access transit facilities is ½ mile. Therefore, because the nearest bus stop is greater than the typical walkshed to access transit facilities, this impact is considered potentially significant. It is noted that the Project, however, would not disrupt or interfere with existing or planned public transit services or facilities.

Mitigation Measure 3.13-7 would require consistency with policies concerning transit systems set forth in the Manteca Transit Short Range Transit Plan (2014), the SCJOG RTP/SCS, and the City of Manteca General Plan. Therefore, with implementation of the following mitigation, the proposed Project would have a **less than significant** impact.

MITIGATION MEASURE(S)

Mitigation Measure 3.13-7: *Prior to approval of improvement plans for each phase of the Project, the Project applicant shall work with Manteca Transit in enhancing future service to serve the Project, consistent with the Project's Transit Plan, as well as the Manteca Transit Short Range Transit Plan (2014), the SCJOG RTP/SCS, and the City of Manteca General Plan. Methods to enhance future service to the Project may include the installation of bus turnouts or bus stops. Any potential agreements to enhance future service to the Project site shall be reflected on the Project improvement plans.*

Impact 3.13-9: The proposed Project may impact at-grade rail crossings. (Less than Significant)

Yosemite Avenue and McKinley Avenue each feature at-grade crossings of a UPRR railroad track. The Project would add about 200 AM peak hour trips and 600 PM peak hour trips to the McKinley Avenue crossing and about 20 AM peak hour trips and 40 PM peak hour trips to the Yosemite Avenue crossing. Each crossing has advanced warning signs, railroad crossing pavement markings,

stop lines, crossing gates, flashing lights, and warning bells. The Project would not cause an increase in delay during train crossings that would correspond to LOS D or worse conditions. Additionally, the Project would not add traffic to an at-grade crossing with a known safety problem. Therefore, this impact is considered **less than significant**.

CUMULATIVE (2040) CONDITIONS TRAFFIC IMPACT ANALYSIS

A Cumulative Conditions analysis was performed to identify potential impacts of the proposed Project under Cumulative (Year 2040) AM and PM peak hour conditions. Local roadway and regional freeway improvements, corresponding Travel Demand Model Forecasts, and intersection and regional freeway segment operations analysis results are presented in this section. Calculations for the Cumulative No Project analysis are in Appendices 3.13-5 and 3.13-6 of Appendix E. The calculations for the Cumulative Plus Project analysis are in Appendices 3.13-7 and 3.13-8 of Appendix E.

Traffic Forecasts

The future cumulative roadway network includes certain roadway improvements, consistent with the SJCOG RTP/SCS project list, which support the level of development anticipated to be in place in 2040. Major improvements within the study area included under Cumulative Conditions are summarized below:

- SR 120 – widened from four to six mixed-flow lanes from I-5 to the west and SR 99 to the east. For future conditions, SR 120 will be widened by 2035 from four to six travel lanes to provide additional capacity for traffic traveling to and from the San Francisco Bay Area. In addition, auxiliary lanes will be constructed between interchanges to improve freeway operations of vehicles entering and exiting SR 120. Because these auxiliary lanes are not capacity improvements, the SR 120 freeway mainline was evaluated using the HCM mainline segment analysis methodology.
- SR 120/McKinley Avenue interchange – partial cloverleaf design with lane configurations based on the *Final Traffic Report for the State Route 120/McKinley Avenue Interchange Project Approval and Environmental Document (PA/ED)* (Fehr & Peers, 2013) including an auxiliary (weaving section) lane on WB SR 120 from Airport Way to McKinley Avenue.
- SR 120 / Union Road Interchange – partial cloverleaf design with lane configurations based on the *Final Traffic Report for the State Route 120/McKinley Avenue Interchange Project Approval and Environmental Document (PA/ED)* (Fehr & Peers, 2007). It should be noted that this intersection may be constructed as a Diverging Diamond Interchange.
- SR 99 / SR 120 Freeway-to-Freeway Interchange – improvements include widening the ramps between Eastbound SR 120 to Southbound SR 99 and Northbound SR 99 to Westbound SR 120 from one to two lanes each. Other improvements to SR 120 and SR 99 would also be included to improve regional traffic flow through this important regional freeway-to-freeway interchange.

- Antone Raymus Expressway (Raymus Expressway) – connects McKinley Avenue with Austin Road to the east. Raymus Expressway traverses McKinley Avenue to the south of the proposed Project.
- Atherton Drive – extended from its current terminus between McKinley Avenue and Airport Way to the west terminus at Woodward Avenue / Atherton Drive.
- Airport Way Widening – various roadway segments were widened between north of East Nile Avenue in the south to Sperry Road in the north. This includes the widening of Airport Way to six lanes between Yosemite Avenue and the SR 120 eastbound ramps.
- Yosemite Avenue Widening – widened to four lanes from SR 120 to east of Union Road.
- Bronzan Road Realignment – the realigned roadway will curve south to intersect the extension of Atherton Drive rather than its current intersection with McKinley Avenue.

In addition to the above, a number of other improvements are assumed, including the extension of Daniels Street to McKinley Avenue, and widening of Union Road (from Lovelace Road to Raymus Expressway) and Main Street (from Lathrop Road to Raymus Expressway) from two to four lanes. Improvements were not assumed at the SR 120/Airport Way interchange because it is not included in the 2014 RTP/SCS. Corresponding intersection improvements were assumed to occur by 2040 based on planned roadway widenings and specific intersection improvements identified in the City's draft PFIP.

The SJCOG / City of Manteca Travel Demand Forecasting (TDF) Model was modified to reflect the following reasonable and foreseeable land uses in the study area:

- Oakwood Trails – located south of SR 120, approximately four miles southwest of downtown Manteca adjacent to the Oakwood Shores neighborhood. This project consists of 676 residential dwelling units, 209.3 thousand square feet of commercial land use, and 252.4 thousand square feet of business park land use.
- Machado Estates – 575 dwelling units located south of Woodward Avenue and west of Airport Way.
- Terra Ranch – 409 dwelling units located directly west of Machado Estates.
- Oakwood Shores – a partially developed residential project (475 dwelling units at build-out) located west of the Project site on Oakwood Lane that has two access locations on Woodward Avenue west of McKinley Avenue.
- Manteca Family Entertainment Zone (FEZ) - 600-room hotel including an indoor waterpark, and a 100 thousand square foot convention/meeting/exhibition facility, and 260,000 square feet of food and beverage, restaurant, and general retail space.
- South Lathrop Specific Plan – 3.9 million square feet of industrial located directly south of the SR 120/Yosemite Avenue interchange.
- Lathrop Gateway Business Park – situated north of SR 120 between Yosemite Avenue and McKinley Avenue, which could yield a maximum of 5.43 million square feet of non-residential uses, according to that project's EIR.
- Griffin Park Master Plan – 339 acre development site consisting of 1,592 residential dwelling units, 65,340 square feet of commercial land use, and 24.46 acres of parks and open space, all located in southern Manteca between Union Road and Main Street. Access

to this project will be possible through Main Street, Tinnin Road, Raymus Expressway, and Sedan Avenue.

Cumulative traffic forecasts were developed using the SJCOG / City of Manteca TDF Model. The process of developing forecasts followed a series of transportation planning industry-standard quantitative steps in which the amount of growth projected by the model is added to the existing counts in order to estimate future year traffic volumes. Traffic forecasts for the Cumulative (2040) Year analysis were developed for the following project scenarios:

- The **Cumulative No Project** scenario includes the 2040 planned roadways and developments, but assumes no development of the proposed Project.
- The **Cumulative Plus Project** scenario adds traffic from the proposed Project to the surrounding roadway system.

A forecasting procedure known as the "difference method" was utilized to develop year 2040 forecasts from the SJCOG future year model. This method accounts for potential differences between the base year model and existing traffic counts that could otherwise transfer to the future year traffic forecast. This forecasting procedure is calculated as follows:

Year 2040 Forecast = Existing Volume + (Year 2040 SJCOG TDM – Base Year SJCOG TDM)

Figures 3.13-9a and 3.13-9b display the Cumulative No Project traffic forecasts. Figure 3.13-6 shows the cumulative distribution of proposed Project trips, which would be slightly different than existing conditions due to additional land use development that may attract trips, construction of the SR 120/McKinley Avenue interchange, the construction of Raymus Expressway and other local roads, and other planned roadway improvements. The SR 120/McKinley Avenue interchange would become the project's primary access for travel to/from the west on SR 120. Figures 3.13-10a and 3.13-10b display the Cumulative Plus Project traffic forecasts.

Intersection Operations

The 21 study intersections, including the two future SR 120/McKinley interchange ramp-terminal intersections, were analyzed under Cumulative No Project and Cumulative Plus Project conditions. The projections are shown in Table 3.13-14.

As shown in Table 3.13-14, 11 of the 12 existing study intersections are projected to operate at unacceptable service levels regardless of whether the Project is developed. This is due to projected traffic growth in the City of Manteca, City of Lathrop, City of Ripon and the rest of San Joaquin County. The results of the analysis show that the addition of Project trips would unacceptably degrade operations at the following study intersections:

- Intersection #2 - Woodward Avenue / McKinley Avenue all-way stop controlled intersection would exacerbate from LOS D and LOS E operations during the AM and PM peak hours, respectively, to LOS F operations;

TABLE 3.13-14: INTERSECTION OPERATIONS – CUMULATIVE CONDITIONS

INTERSECTION	JURISDICTION	TRAFFIC CONTROL	PEAK HOUR	CUMULATIVE		CUMULATIVE + PROJECT	
				DELAY[1] (SEC/VEH)	LOS	DELAY[1] (SEC/VEH)	LOS
1. Yosemite Avenue / McKinley Avenue	City of Lathrop	AWSC	AM	27	D	28	D
			PM	**55**	**F**	**56**	**F**
2. Woodward Avenue / McKinley Avenue	City of Manteca	AWSC	AM	35	D	**64**	**F**
			PM	**47**	**E**	**60**	**F**
3. Yosemite Avenue / Airport Way	City of Manteca	Signal	AM	41	D	43	D
			PM	**78**	**E**	**80**	**F**
4. Daniels Street / Airport Way	City of Manteca	Signal	AM	22	C	22	C
			PM	**102**	**F**	**110**	**F**
5. SR 120 Westbound Ramps / Airport Way	Caltrans	Signal	AM	**108**	**F**	**137**	**F**
			PM	**191**	**F**	**224**	**F**
6. SR 120 Eastbound Ramps / Airport Way	Caltrans	Signal	AM	50	D	**71**	**E**
			PM	**174**	**F**	**215**	**F**
7. Atherton Drive / Airport Way	City of Manteca	SSSC	AM	**25 (359)**	**C (F)**	**2 (536)**	**A (F)**
			PM	**2 (2171)**	**A (F)**	**2 (4190)**	**A (F)**
8. Woodward Avenue / Airport Way	City of Manteca	AWSC	AM	23	C	**53**	**F**
			PM	**49**	**E**	**65**	**F**
9. SR 120 Westbound Ramps / Union Road	Caltrans	Signal	AM	**71**	**E**	**72**	**E**
			PM	**131**	**F**	**136**	**F**
10. SR 120 Eastbound Ramps / Union Road	Caltrans	Signal	AM	**140**	**F**	**144**	**F**
			PM	**246**	**F**	**253**	**F**
11. Atherton Drive / Union Road	City of Manteca	Signal	AM	47	D	49	D
			PM	49	D	51	D
12. Woodward Avenue / Union Road	City of Manteca	AWSC	AM	**54**	**F**	**54**	**F**
			PM	**64**	**F**	**63**	**F**
13. Atherton Drive / McKinley Avenue	City of Manteca	Signal	AM	20	C	29	C
			PM	34	C	**126**	**F**
14. Atherton Drive - Joshua Street / Woodward Avenue	City of Manteca	AWSC	AM	10	B	12	B
			PM	11	B	15	C
15. Atherton Drive / Multi-Family Driveway	City of Manteca	SSSC	AM	**17 (91)**	**C (F)**	**85 (526)**	**F (F)**
			PM	**467 (860)**	**F (F)**	**1281 (2880)**	**F (F)**
16. Atherton Drive / Dutch Harbor Way - Commercial Driveway	City of Manteca	SSSC	AM	-	-	6 (15)	A (B)
			PM	-	-	**142 (383)**	**F (F)**
17. Woodward Avenue / Yukon Avenue - Street "A"	City of Manteca	SSSC	AM	-	-	4 (14)	A (B)
			PM	-	-	3 (18)	A (C)
18. McKinley Avenue / Denali Drive	City of Manteca	SSSC	AM	-	-	1 (15)	A (B)
			PM	-	-	**3 (60)**	**A (F)**
19. McKinley Avenue / Street "B"	City of Manteca	AWSC	AM	-	-	15	B
			PM	-	-	27	D
20. SR 120 Westbound Ramps / McKinley Avenue	Caltrans	Signal	AM	6	A	6	A
			PM	6	A	7	A
21. SR 120 Eastbound Ramps / McKinley Avenue	Caltrans	Signal	AM	5	A	5	A
			PM	8	A	12	B

NOTES:

1. *FOR SIGNALIZED AND ALL-WAY STOP CONTROLLED INTERSECTIONS, AVERAGE INTERSECTION DELAY IS REPORTED IN SECONDS PER VEHICLE FOR ALL APPROACHES. FOR SIDE-STREET STOP CONTROLLED INTERSECTIONS, THE DELAY AND LOS FOR THE MOST-DELAYED INDIVIDUAL MOVEMENT IS SHOWN IN PARENTHESES NEXT TO THE AVERAGE INTERSECTION DELAY AND LOS. ALL RESULTS ARE ROUNDED TO THE NEAREST SECOND.*

AWSC = ALL-WAY STOP CONTROL; SSSC = SIDE-STREET STOP CONTROL. ***BOLD*** *REPRESENTS UNACCEPTABLE OPERATIONS.* ***BOLD AND UNDERLINED*** *REPRESENTS SIGNIFICANT IMPACTS.*

SOURCE: FEHR & PEERS, 2016.

- Intersection #4 - Daniels Street / Airport Way signalized intersection would exacerbate LOS F operations by more than three seconds during the PM peak hour;
- Intersection #5 - SR 120 Westbound Ramps / Airport Way signalized intersection would exacerbate LOS F operations during the AM and PM peak hours due to the addition of more than 100 vehicles per day;
- Intersection #6 - SR 120 Eastbound Ramps / Airport Way signalized intersection would exacerbate LOS F operations during the AM and PM peak hours due to the addition of more than 100 vehicles per day;
- Intersection #7 – Atherton Drive / Airport Way side-street stop controlled intersection would exacerbate LOS F operations by more than three seconds during the AM and PM peak hours;
- Intersection #8 – Woodward Avenue / Airport Way all-way stop controlled intersection would exacerbate operations to LOS F during the AM and PM peak hours;
- Intersection #9 - SR 120 Westbound Ramps / Union Road signalized intersection would exacerbate LOS F operations during the PM peak hour due to the addition of more than 100 vehicles per day; and
- Intersection #10 - SR 120 Eastbound Ramps / Union Road signalized intersection would exacerbate LOS F operations during the AM and PM peak hours due to the addition of more than 100 vehicles per day.

In addition, the following Project site intersections would be impacted by the addition of Project-generated traffic:

- Intersection #13 - McKinley Avenue / Atherton Road would exacerbate from LOS C to LOS F during the PM peak hour;
- Intersection #15 - Atherton Drive / Multi-Family Driveway side-street stop controlled intersection would exacerbate LOS F by more than three seconds during the AM and PM peak hours;
- Intersection #16 - Atherton Drive / Dutch Harbor Way / Commercial Driveway (new side-street stop controlled intersection) would operate at LOS F during the PM peak hour; and
- Intersection #18 - McKinley Avenue / Denali Drive (new side-street stop controlled intersection) would operate at LOS F during the PM peak hour.

Traffic signal warrant analyses were prepared for the Cumulative Plus Project scenario where the Cumulative (No Project) volumes resulted in LOS E or LOS F conditions for either side-street stop controlled (Intersections #7, #15, #16, and #18) or all-way stop controlled (Intersections #1, #2, #8, and #12). The results are shown in Table 3.13-15. As shown in the table, only the intersections of Atherton Drive / Commercial Driveway and McKinley Avenue / Denali Drive do not meet signal warrants. Detailed signal warrant assessments are provided in Appendix 3.13-10 of Appendix E.

TABLE 3.13-15: PEAK HOUR SIGNAL WARRANT ANALYSIS – CUMULATIVE CONDITIONS

INTERSECTION	*JURISDICTION*	*TRAFFIC CONTROL*	*CUMULATIVE PLUS PROJECT AM / PM PEAK HOUR WARRANT MET?* [1]
1. Yosemite Avenue/McKinley Avenue	Lathrop	AWSC	NO / YES
2. Woodward Avenue/McKinley Avenue	City of Manteca	AWSC	YES / YES
7. Atherton Drive/Airport Way	City of Manteca	SSSC	YES / YES
8. Woodward Avenue/Airport Way	City of Manteca	AWSC	YES / YES
12. Woodward Avenue/Union Road	City of Manteca	AWSC	YES / YES
15. Atherton Drive/Multi-Family Driveway	City of Manteca	SSSC	YES / YES
16. Atherton Drive/Commercial Driveway	City of Manteca	SSSC	NO / YES
18. McKinley Avenue/Denali Drive	City of Manteca	SSSC	NO / NO

NOTES:

1. EVALUATED BASED ON PEAK HOUR VOLUME WARRANT CONTAINED IN CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (CA MUTCD), CALTRANS, 2014.

AWSC = ALL-WAY STOP CONTROL; SSSC = SIDE-STREET STOP CONTROL.

SOURCE: FEHR & PEERS, 2016

Freeway Analysis

Cumulative No Project and Cumulative Plus Project freeway operations were evaluated for AM and PM peak hours. The results are shown in Table 3.13-16. These results include the planned widening of SR 120 from four to six lanes, with three mixed-flow travel lanes in each direction. The results also include the new partial cloverleaf (par-clo) interchange at SR 120 / McKinley Avenue.

As shown in Table 3.13-16, 16 of the 20 freeway segments are projected to operate at unacceptable service levels regardless of whether the Project is developed. This is due to projected traffic growth in San Joaquin County, Stanislaus County, and the rest of the Central Valley of California.

The addition of Project-generated traffic would cause one segment of westbound SR 120 during the AM peak hour and two segments of westbound SR 120 during the PM peak hour which operate at marginal LOS D conditions to degrade to unacceptable LOS E conditions. The Project would add traffic to segments of SR 120 and unacceptably degrade operations at the following study freeway locations:

- Eastbound SR 120 mainline between Yosemite Avenue and McKinley Avenue exacerbates LOS F conditions during the PM peak hour from a density of 51.2 to density of 61.7;
- Eastbound SR 120 off-ramp at McKinley Avenue exacerbates LOS F conditions during the PM peak hour from a density of 39.1 to density of 43.4;
- Eastbound SR 120 slip on-ramp at McKinley Avenue exacerbates LOS E conditions during the PM peak hour from a density of 43.2 to density of 45.6;
- Eastbound SR 120 mainline between McKinley Avenue and Airport Way exacerbates LOS E conditions during the PM peak hour from a density of 41.3 to density of 44.6;

TABLE 3.13-16: FREEWAY OPERATIONS – CUMULATIVE CONDITIONS

INTERSECTION	TYPE	PEAK HOUR	CUMULATIVE NO PROJECT		CUMULATIVE + PROJECT	
			DENSITY	LOS	DENSITY	LOS
1. SR 120 EB between Yosemite Avenue and McKinley Avenue	Mainline	AM	23.8	C	24.8	C
		PM	**51.2**	**F**	**61.7**	**F**
2. SR 120 EB off-ramp at McKinley Avenue	Diverge	AM	21.1	C	21.9	C
		PM	**39.1**	**F**	**43.4**	**F**
3. SR 120 EB loop on-ramp at McKinley Avenue	Merge	AM	23.4	C	23.6	C
		PM	32.7	D	32.9	D
4. SR 120 EB slip on-ramp at McKinley Avenue	Merge	AM	27.0	C	28.4	D
		PM	**43.2**	**E**	**45.6**	**E**
5. SR 120 EB between McKinley Avenue and Airport Way	Mainline	AM	23.0	C	24.0	C
		PM	**41.3**	**E**	**44.6**	**E**
6. SR 120 EB off-ramp at Airport Way	Diverge	AM	28.4	D	30.9	D
		PM	**43.4**	**E**	**47.7**	**E**
7. SR 120 EB on-ramp at Airport Way	Merge	AM	28.3	D	29.3	D
		PM	**43.1**	**E**	**44.1**	**E**
8. SR 120 EB between Airport Way and Union Road	Mainline	AM	24.3	C	25.4	C
		PM	**41.2**	**E**	**43.3**	**E**
9. SR 120 EB off-ramp at Union Road	Diverge	AM	**35.8**	**E**	**37.3**	**E**
		PM	**52.0**	**E**	**53.4**	**E**
10. SR 120 EB on-ramp at Union Road	Merge	AM	28.2	D	29.1	D
		PM	**39.7**	**E**	**40.8**	**E**
11. SR 120 WB off-ramp at Union Road	Diverge	AM	**39.9**	**E**	**40.2**	**E**
		PM	**45.9**	**E**	**47.2**	**E**
12. SR 120 WB on-ramp at Union Road	Merge	AM	**39.2**	**E**	**39.7**	**E**
		PM	**37.3**	**E**	**38.9**	**E**
13. SR 120 WB between Union Road and Airport Way	Mainline	AM	**36.8**	**E**	**37.6**	**E**
		PM	33.1	D	**35.2**	**E**
14. SR 120 WB off-ramp at Airport Way	Diverge	AM	**50.3**	**E**	**50.7**	**E**
		PM	**44.3**	**E**	**45.6**	**E**
15. SR 120 WB on-ramp at Airport Way	Merge	AM	32.7	D	34.0	D
		PM	31.3	D	33.8	D
16. SR 120 WB between Airport Way and McKinley Avenue	Mainline	AM	32.8	D	34.1	D
		PM	29.8	D	31.8	D
17. SR 120 WB off-ramp at McKinley Avenue	Diverge	AM	**40.8**	**E**	**42.7**	**E**
		PM	**41.8**	**E**	**56.6**	**E**
18. SR 120 WB loop on-ramp at McKinley Avenue	Merge	AM	33.0	D	**35.6**	**E**
		PM	29.1	D	31.5	D
19. SR 120 WB slip on-ramp at McKinley Avenue	Merge	AM	**40.0**	**E**	**42.5**	**F**
		PM	33.0	D	35.0	D
20. SR 120 WB between McKinley Avenue and Yosemite Avenue	Mainline	AM	**40.7**	**E**	**45.7**	**F**
		PM	33.4	D	**36.7**	**E**

NOTES:
1. EVALUATED USING THE HCS2010 SOFTWARE, WHICH APPLIES THE METHODS FROM THE HIGHWAY CAPACITY MANUAL (TRANSPORTATION RESEARCH BOARD, 2010).
***BOLD** REPRESENTS UNACCEPTABLE OPERATIONS. **BOLD AND UNDERLINED** REPRESENTS SIGNIFICANT IMPACTS.*
SOURCE: FEHR & PEERS, 2016.

- Eastbound SR 120 off-ramp at Airport Way exacerbates LOS E conditions during the PM peak hour from a density of 43.4 to density of 47.7;
- Eastbound SR 120 on-ramp at Airport Way exacerbates LOS E conditions during the PM peak hour from a density of 43.1 to density of 44.1;
- Eastbound SR 120 mainline between Airport Way and Union Road exacerbates LOS E conditions during the PM peak hour from a density of 41.2 to density of 43.3;
- Eastbound SR 120 off-ramp at Union Road exacerbates LOS E conditions during the AM and PM peak hours from a density of 35.8 to 37.3 and from 52.0 to 53.4, respectively;
- Eastbound SR 120 on-ramp at Union Road exacerbates LOS E conditions during the PM peak hour from a density of 39.7 to density of 40.8;
- Westbound SR 120 off-ramp at Union Road exacerbates LOS E conditions during the AM and PM peak hours from a density of 39.9 to 40.2 and from 45.9 to 47.2, respectively;
- Westbound SR 120 on-ramp at Union Road exacerbates LOS E conditions during the AM and PM peak hours from a density of 39.2 to 39.7 and from 37.3 to 38.9, respectively;
- Westbound SR 120 mainline between Union Road and Airport Way exacerbates LOS E conditions during the AM and PM peak hours from a density of 36.8 to 37.6 and from 33.1 to 35.2, respectively;
- Westbound SR 120 off-ramp at Airport Way exacerbates LOS E conditions during the AM and PM peak hours from a density of 50.3 to 50.7 and from 44.3 to 45.6, respectively;
- Westbound SR 120 off-ramp at McKinley Avenue exacerbates LOS E conditions during the AM and PM peak hours from a density of 40.8 to 42.7 and from 41.8 to 56.6, respectively;
- Westbound SR 120 loop on-ramp at McKinley Avenue exacerbates conditions during the AM peak hour from LOS D (density of 33.0) to LOS E (density of 35.6);
- Westbound SR 120 slip on-ramp at McKinley Avenue exacerbates conditions during the AM peak hour from LOS E (density of 40.0) to LOS F (density of 42.5); and
- Westbound SR 120 mainline between McKinley Avenue and Yosemite Avenue exacerbates conditions during the AM and PM peak hours from LOS E (density of 40.7) to LOS F (density of 45.7) and from LOS D (density of 33.4) to LOS E (density of 36.7).

Impact 3.13-10: Under Cumulative conditions, the proposed Project would impact the Yosemite Avenue / McKinley Avenue intersection. (Less Than Significant)

The Project would cause an impact to the Yosemite Avenue / McKinley Avenue intersection, which is an all-way stop controlled intersection within the City of Lathrop. The Yosemite Avenue / McKinley Avenue intersection is projected to operate at LOS F with 55 seconds of delay during the PM peak hour. The addition of project traffic would exacerbate LOS F conditions and increase intersection delay to 56 seconds. The increase in intersection delay is less than five seconds as

defined by the significance criteria for the City of Lathrop. Therefore, this impact is **less than significant**.

Impact 3.13-11: Under Cumulative conditions, the proposed Project would impact the McKinley Avenue / Woodward Avenue intersection. (Significant and Unavoidable in the Short-Term, Less Than Significant in the Long-Term)

The Project would cause significant impacts to the McKinley Avenue / Woodward Avenue intersection, which is an all-way stop controlled intersection within the City of Manteca. The McKinley Avenue / Woodward Avenue intersection is projected to operate at LOS E with 47 seconds of delay during the PM peak hour. The addition of Project traffic would exacerbate intersection operations by more than three seconds during the PM peak hour, resulting in LOS F and 60 seconds of delay.

This study intersection is under City of Manteca jurisdiction. The following measures have been identified in the City's PFIP to improve intersection operations from LOS F to LOS D conditions:

- Construct a roundabout at the intersection; and
- Construct left-turn pockets on all approaches.

The City of Manteca would be responsible for the intersection improvement, acquisition of right-of-way, and construction; therefore, based on the significance criteria, this impact is considered **significant and unavoidable** in the short-term until the planned improvements are complete. The Project applicant would be required to pay their fair share fee towards the intersection improvements, as required by Mitigation Measure 3.13-8. It is noted that this impact would be reduced to **less than significant** once these improvements are in place.

MITIGATION MEASURE(S)

Mitigation Measure 3.13-8: *Prior to issuance of building permits for each phase of the Project, the Project applicant shall pay their proportionate fair share cost to construct a roundabout and left-turn pockets at the McKinley Avenue / Woodward Avenue intersection. If the aforementioned improvements are specifically included in the transportation PFIP, then the Project applicant shall contribute their proportionate fair share funding by paying the transportation PFIP fee due at building permit issuance.*

Impact 3.13-12: Under Cumulative conditions, the proposed Project would result in a significant impact at the Daniels Street / Airport Way intersection. (Significant and Unavoidable in the Short-Term, Less Than Significant in the Long-Term)

The Project would cause significant impacts to the Daniels Street / Airport Way intersection, which is signalized and within the City of Manteca. The Daniels Street / Airport Way intersection is

projected to operate at LOS F with 102 seconds of delay during the PM peak hour. The addition of Project traffic would exacerbate the intersection's operations to LOS F with 110 seconds of delay.

This study intersection is under City of Manteca jurisdiction. The following measures have been identified in the City's PFIP to improve intersection operations from LOS F to LOS D conditions:

- Re-stripe the existing eastbound through lane to provide a shared through/right lane; and
- Construct a third southbound through lane.

The City of Manteca would be responsible for the intersection improvement, acquisition of right-of-way, and construction; therefore, based on the significance criteria, this impact is considered **significant and unavoidable** in the short-term until the planned improvements are complete. The Project applicant would be required to pay their fair share fee towards the intersection improvements, as required by Mitigation Measure 3.13-9. It is noted that this impact would be reduced to **less than significant** once these improvements are in place.

MITIGATION MEASURE(S)

Mitigation Measure 3.13-9: *Prior to issuance of building permits for each phase of the Project, the Project applicant shall pay their proportionate fair share cost to restripe and construct a third southbound through lane at the Daniels Street / Airport Way intersection. If the aforementioned improvements are specifically included in the transportation PFIP, then the Project applicant shall contribute their proportionate fair share funding by paying the transportation PFIP fee due at building permit issuance.*

Impact 3.13-13: Under Cumulative conditions, Project implementation would exacerbate unacceptable levels of service at the SR 120 / Airport Way interchange. (Significant and Unavoidable in the Short-Term, Less Than Significant in the Long-Term)

The signalized SR 120 / Airport Way ramp-terminal intersections are projected to operate at unacceptable LOS F conditions during the PM peak hour under Cumulative No Project. The addition of Project traffic would exacerbate unacceptable operations at these intersections.

This study intersection is included in the City's PFIP. The following measures have been identified in the City of Manteca PFIP to provide acceptable operations under Cumulative conditions:

- Relocate the westbound ramp-terminal intersection approximately 180 feet south of its current location to create a tight interchange configuration, which will increase the spacing to the Airport Way/Daniels Street intersection;
- Construct loop on-ramps;
- Widen overcrossing to include two northbound and three southbound lanes; and
- Widen SR 120 eastbound and westbound off-ramps to include two left-turn lanes and two right-turn lanes.

The above measures are regional or city-wide improvements and are programed as such. The proposed Project would pay the appropriate regional traffic impact fees as a contribution toward these improvements. The SR 120 WB Ramps / Airport Way intersection would operate at LOS C during both the AM and PM peak hours. The SR 120 EB Ramps/Airport Way intersection would operate at LOS A during the AM peak hour and LOS C during the PM peak hour.

These measures are within the jurisdiction of Caltrans and beyond the control of the City of Manteca to implement without Caltrans approval. Additionally, funding for the remaining share of the total cost of the interchange improvements has not been secured. If Caltrans does not approve the proposed improvements and/or full funding is not secured, then the intersections would continue to operate at an unacceptable LOS, and the Project's contribution to this impact would be considered a significant impact. Therefore, based on the significance criteria, this impact is considered **significant and unavoidable** in the short-term until the planned improvements are complete. The Project applicant would be required to pay their fair share fee towards the intersection improvement, as required by Mitigation Measure 3.13-10. It is noted that this impact would be reduced to **less than significant** once these improvements are in place.

MITIGATION MEASURE(S)

Mitigation Measure 3.13-10: *Prior to issuance of building permits for each phase of the Project, the Project applicant shall contribute the appropriate San Joaquin Regional Traffic Impact Fee (RTIF) to cover their proportionate cost of the improvements to the SR 120 / Airport Way interchange in order to satisfy their fair share obligation.*

Impact 3.13-14: Under Cumulative conditions, the proposed Project would result in a significant impact at the Atherton Drive / Airport Way intersection. (Significant and Unavoidable in the Short-Term, Less Than Significant in the Long-Term)

The Project would cause significant impacts to the Atherton Drive / Airport Way intersection, which is a side street stop controlled intersection in the City of Manteca. The Atherton Drive / Airport Way intersection is projected to operate at LOS F under Cumulative AM and PM peak hour conditions. The addition of Project traffic would exacerbate the LOS F conditions during both peak hours.

This study intersection is under City of Manteca jurisdiction and the following measures, identified in the City's PFIP, would improve intersection operations from LOS F to LOS C and LOS B during the AM and PM peak hours, respectively:

- Signalize the intersection;
- Construct a second northbound through lane; and
- Construct a second southbound through lane.

The City of Manteca would be responsible for the intersection improvement, acquisition of right-of-way, and construction; therefore, based on the significance criteria, this impact is considered

significant and unavoidable in the short-term until the planned improvements are complete. The Project applicant would be required to pay their fair share fee towards the intersection improvements, as required by Mitigation Measure 3.13-1. It is noted that this impact would be reduced to **less than significant** once these improvements are in place.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-1.***

Impact 3.13-15: Under Cumulative conditions, the proposed Project would result in a significant impact at the Airport Way / Woodward Avenue intersection. (Significant and Unavoidable in the Short-Term, Less Than Significant in the Long-Term)

The Project would cause a significant impact to the Airport Way / Woodward Avenue intersection, which is an all-way stop controlled intersection in the City of Manteca. The Airport Way / Woodward Avenue intersection is projected to operate at LOS C and LOS E under Cumulative AM and PM peak hours, respectively. The addition of Project traffic would exacerbate operations during both peak hours to LOS F conditions.

This study intersection is under City of Manteca jurisdiction and the following measures, which have been identified in the City's PFIP, would improve intersection operations from LOS F to LOS C and LOS D during the AM and PM peak hours, respectively:

- Signalize the intersection;
- Construct southbound left-turn and right-turn pockets; and
- Construct a northbound left-turn pocket.

The City of Manteca would be responsible for the intersection improvement, acquisition of right-of-way, and construction; therefore, based on the significance criteria this impact is considered **significant and unavoidable** in the short-term until the planned improvements are complete. The Project applicant would be required to pay their fair share fee towards the intersection improvements, as required by Mitigation Measure 3.13-2. It is noted that this impact would be reduced to **less than significant** once these improvements are in place.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-2.***

Impact 3.13-16: Under Cumulative conditions, Project implementation would exacerbate cumulatively unacceptable LOS at the SR 120 / Union Road interchange. (Significant and Unavoidable in the Short-Term, Less Than Significant in the Long-Term)

The signalized SR 120 / Union Road ramp-terminal intersections are projected to operate at unacceptable LOS E or LOS F conditions during both peak hours under Cumulative No Project. The addition of Project traffic would exacerbate unacceptable operations at these intersections by more than three seconds

As noted previously, a detailed study and design of the Union Road / SR 120 interchange is currently underway. With implementation of the interchange project's partial cloverleaf alternative, the Union Road ramp terminal intersections would operate at LOS A under Cumulative Plus Project conditions. The Project applicant would be required to pay their fair share fee towards the improvement, as required by Mitigation Measure 3.13-11. Calculations for this analysis are in Appendix 3.13-9. The Union Road ramp terminal intersections would also operate acceptably under Cumulative Plus Project conditions with the construction of a Diverging Diamond Interchange (DDI). However, Caltrans would be responsible for the intersection improvement; therefore, based on the significance criteria, this impact is considered **significant and unavoidable** in the short-term until the planned improvements are completed, and **less than significant** once the improvements are in place.

MITIGATION MEASURE(S)

Mitigation Measure 3.13-11: *Prior to issuance of building permits for each phase of the Project, the Project applicant(s) shall contribute the appropriate San Joaquin Regional Traffic Impact Fee (RTIF) to cover their proportionate cost of the improvements at the SR 120 / Union Road interchange.*

Impact 3.13-17: Under Cumulative conditions the proposed Project would result in an impact at the McKinley Avenue / Atherton Drive intersection. (Significant and Unavoidable in the Short-Term, Less Than Significant in the Long-Term)

The signalized McKinley Avenue / Atherton Drive intersection is projected to operate at acceptable LOS C conditions during both peak hours under Cumulative No Project. The addition of Project traffic would result in unacceptable LOS F during the PM peak hour.

The McKinley Avenue / Atherton Drive intersection is included in the City of Manteca's PFIP. In addition to contributing towards the construction of the McKinley Avenue / Atherton Drive intersection, the following measure has been identified in to improve intersection operations from LOS F to LOS D during the PM peak hour:

- Optimize signal timings.

The City of Manteca would be responsible for the intersection improvement; therefore, based on the significance criteria, this impact is considered **significant and unavoidable** in the short-term until the planned improvements are complete. The Project applicant would be required to pay their fair share fee towards the intersection improvement, as required by Mitigation Measure 3.13-12. It is noted that this impact would be reduced to **less than significant** once the improvement is in place.

MITIGATION MEASURE(S)

Mitigation Measure 3.13-12: *Prior to issuance of building permits for each phase of the Project, the Project applicant shall pay their proportionate fair share cost to optimize the signal timings at the McKinley Avenue / Atherton Drive intersection. If the aforementioned improvement is specifically included in the transportation PFIP, then the Project applicant shall contribute their proportionate fair share funding by paying the transportation PFIP fee due at building permit issuance.*

Impact 3.13-18: Under Cumulative conditions, the proposed Project would result in a significant impact at the Atherton Drive / Multi-Family Driveway intersection. (Less Than Significant with Mitigation)

The Project would cause significant impacts to the Atherton Drive / Multi-Family Driveway intersection, which is an all-way stop controlled intersection in the City of Manteca. The Atherton Drive / Airport Way intersection is projected to operate at LOS E and LOS F under Cumulative AM and PM peak hour conditions, respectively. The addition of Project traffic would exacerbate the LOS E conditions during the AM peak hour by more than three seconds.

The following measure has been identified to improve intersection operations from LOS E and LOS F to LOS B and LOS D during the AM and PM peak hours, respectively:

- Signalize the intersection.

The Project applicant would be responsible for the above intersection improvement. Construction of the aforementioned improvement would result in an acceptable delay at the Atherton Drive / Multi-Family Driveway intersection. Therefore, based on the significance criteria and with implementation of Mitigation Measure 3.13-13, this impact is considered **less than significant**.

MITIGATION MEASURE(S)

Mitigation Measure 3.13-13: *Prior to issuance of building permits for each phase of the Project, the Project applicant shall pay for and construct the following improvement at the Atherton Drive / Multi-Family Driveway intersection:*

- *Signalize the intersection.*

Impact 3.13-19: Under Cumulative conditions, the proposed Project would result in a significant impact at the Atherton Drive / Commercial Driveway intersection. (Less Than Significant with Mitigation)

The Project would cause significant impacts to the Atherton Drive / Commercial Driveway intersection, which is a side-street stop controlled intersection in the City of Manteca. The addition of Project-generated traffic to the Atherton Drive / Dutch Harbor Way / Commercial Driveway intersection would cause the intersection to operate at LOS F with 383 seconds of delay during the PM peak hour.

This study intersection is under City of Manteca jurisdiction. The following measures have been identified to improve intersection operations from unacceptable LOS F with 383 seconds of delay to acceptable LOS B with 19 seconds of delay during the PM peak hour:

- Signalize the intersection;
- Construct an eastbound left-turn lane; and
- Construct a southbound left-turn lane in addition to a shared through/right lane.

The Project applicant would be responsible for the intersection improvement, acquisition of right-of-way, and construction. Construction of the aforementioned improvements would result in an acceptable delay at the Atherton Drive / Commercial Driveway intersection. Therefore, based on the significance criteria and with implementation of Mitigation Measure 3.13-4, this impact is considered **less than significant**.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-4.***

Impact 3.13-20: Under Cumulative conditions, the proposed Project would result in an impact at the McKinley Avenue / Denali Drive intersection. (Significant and Unavoidable in the Short-Term, Less Than Significant in the Long-Term)

The Project would cause significant impacts to the McKinley Avenue / Denali Drive intersection, which is a stop controlled intersection within the City of Manteca. The intersection would operate at unacceptable LOS F conditions during the PM peak hour.

This study intersection is included in the City's PFIP. The following measure has been identified in the City of Manteca PFIP to improve intersection operations from LOS F to LOS D during the PM peak hour:

- Construct a second northbound through lane.

The City of Manteca would be responsible for the intersection improvement, acquisition of right-of-way, and construction; therefore, based on the significance criteria, this impact is considered

significant and unavoidable in the short-term until the planned improvements are complete. The Project applicant would be required to pay their fair share fee towards the intersection improvements, as required by Mitigation Measure 3.13-14. It is noted that this impact would be reduced to **less than significant** once these improvements are in place.

MITIGATION MEASURE(S)

Mitigation Measure 3.13-14: *Prior to issuance of building permits for each phase of the Project, the Project applicant shall pay their proportionate fair share cost to signalize and construct a second northbound through lane at the McKinley Avenue / Denali Drive intersection. If the aforementioned improvements are specifically included in the transportation PFIP, then the Project applicant shall contribute their proportionate fair share funding by paying the transportation PFIP fee due at building permit issuance.*

Impact 3.13-21: Under Cumulative conditions, the proposed Project would result in an impact at the SR 120 / McKinley Avenue interchange. (Significant and Unavoidable in the Short-Term, Less Than Significant in the Long-Term)

The signalized SR 120/McKinley Avenue ramp-terminal intersections are projected to operate at acceptable LOS A conditions during both peak hours under Cumulative No Project. The addition of Project traffic would result in acceptable LOS B or better during both peak hours. Table 3.13-17 shows the intersection delay and LOS during the Cumulative Plus Project condition, with mitigation.

A new interchange on SR 120 at McKinley Avenue is undergoing design by the City of Manteca and Caltrans District 10. The new SR 120 / McKinley Avenue interchange is included as a Tier 1 (Funded) project in the adopted 2014-2040 SJCOG 2014 RTP/SCS with an open to traffic date of 2021. This impact is considered **significant and unavoidable** in the short-term until the planned improvements are completed. The Project applicant would be required to pay their fair share fee towards the intersection improvement, as required by Mitigation Measure 3.13-5. It is noted that this impact would be reduced to **less than significant** once these improvements are in place.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-5.***

TABLE 3.13-17: INTERSECTION OPERATIONS – CUMULATIVE PLUS PROJECT CONDITIONS WITH MITIGATION

INTERSECTION	*JURISDICTION*	*TRAFFIC CONTROL*	*PEAK HOUR*	*CUMULATIVE PLUS PROJECT*		*CUMULATIVE + PROJECT WITH MITIGATION*	
				DELAY[1] (SEC/VEH)	*LOS*	*DELAY[1] (SEC/VEH)*	*LOS*
2. McKinley Avenue / Woodward Avenue	City of Manteca	Signal	AM	**64**	**F**	45	D
			PM	**60**	**F**	42	D
4. Airport Way / Daniels Street	City of Manteca	Signal	AM	22	C	22	C
			PM	**110**	**F**	52	D
5. Airport Way / SR 120 Westbound Ramps	Caltrans	Signal	AM	**137**	**F**	24	C
			PM	**224**	**F**	30	C
6. Airport Way / SR 120 Eastbound Ramps	Caltrans	Signal	AM	**71**	**E**	10	A
			PM	**215**	**F**	33	C
7. Atherton Drive / Airport Way	City of Manteca	Signal	AM	**2 (536)**	**A (F)**	21	C
			PM	**2 (4190)**	**A (F)**	20	B
8. Woodward Avenue / Airport Way	City of Manteca	Signal	AM	**53**	**F**	34	C
			PM	**65**	**F**	54	D
9. Union Road / SR 120 Westbound Ramps	Caltrans	Signal	AM	**72**	**E**	7	A
			PM	**136**	**F**	7	A
10. Union Road / SR 120 Eastbound Ramps	Caltrans	Signal	AM	**144**	**F**	6	A
			PM	**253**	**F**	8	A
13. McKinley Avenue / Atherton Road	City of Manteca	Signal	AM	29	C	28	C
			PM	**126**	**F**	54	D
15. Atherton Road / Multifamily Driveway-Oakwood Trails Driveway	City of Manteca	Signal	AM	**85 (526)**	**F (F)**	18	B
			PM	**1281 (2880)**	**F (F)**	55	D
16. Atherton Drive / Dutch Harbor Way / Commercial Driveway	City of Manteca	Signal	AM	6 (15)	A (B)	15	B
			PM	**142 (383)**	**F (F)**	19	B
18. McKinley Drive / Denali Drive	City of Manteca	SSSC	AM	1 (15)	A (B)	1 (13)	A (B)
			PM	**3 (60)**	**A (F)**	2 (29)	A (D)

NOTES:

1. FOR SIGNALIZED AND ALL-WAY STOP CONTROLLED INTERSECTIONS, AVERAGE INTERSECTION DELAY IS REPORTED IN SECONDS PER VEHICLE FOR ALL APPROACHES. FOR SIDE-STREET STOP CONTROLLED INTERSECTIONS, THE DELAY AND LOS FOR THE MOST-DELAYED INDIVIDUAL MOVEMENT IS SHOWN IN PARENTHESES NEXT TO THE AVERAGE INTERSECTION DELAY AND LOS. ALL RESULTS ARE ROUNDED TO THE NEAREST SECOND.

*2. **BOLD** REPRESENTS UNACCEPTABLE OPERATIONS.*

SOURCE: FEHR & PEERS, 2016.

Impact 3.13-22: Under Cumulative conditions, the proposed Project would result in a significant impact to freeway facilities. (Significant and Unavoidable)

The addition of Project-generated traffic would exacerbate unacceptable (i.e., LOS E) peak hour operations on the following freeway facilities:

- Eastbound SR 120 mainline from Yosemite Avenue to McKinley Avenue (PM peak hour);
- Eastbound SR 120 off-ramp at McKinley Avenue (PM peak hour);
- Eastbound SR 120 slip on-ramp at McKinley Avenue (PM peak hour);
- Eastbound SR 120 mainline from McKinley Avenue to Airport Way (PM peak hour);

- Eastbound SR 120 off-ramp at Airport Way (PM peak hour);
- Eastbound SR 120 on-ramp at Airport Way (PM peak hour);
- Eastbound SR 120 mainline from Airport Way to Union Road (PM peak hour);
- Eastbound SR 120 off-ramp at Union Road (AM and PM peak hours);
- Eastbound SR 120 on-ramp at Union Road (PM peak hour);
- Westbound SR 120 off-ramp at Union Road (AM and PM peak hours);
- Westbound SR 120 on-ramp at Union Road (AM and PM peak hours);
- Westbound SR 120 mainline from Union Road to Airport Way (AM and PM peak hours);
- Westbound SR 120 off-ramp at Airport Way (AM and PM peak hours);
- Westbound SR 120 off-ramp at McKinley Avenue (AM and PM peak hours);
- Westbound SR 120 loop on-ramp at McKinley Avenue (AM peak hour);
- Westbound SR 120 slip on-ramp at McKinley Avenue (AM peak hour); and
- Westbound SR 120 mainline from McKinley Avenue to Yosemite Avenue (AM and PM peak hours).

Project traffic would cause in excess of a 100 vehicle-per-day increase on the impacted SR 120 mainline or in excess of a one percent increase in on-ramp or off-ramp volumes at these locations. This impact is **significant and unavoidable**.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-5.***

Impact 3.13-23: Under Cumulative conditions, the proposed Project would adversely affect pedestrian and bicycle facilities. (Less than Significant with Mitigation)

The Project would provide sidewalks and bicycle lanes in conjunction with the design of the vehicular circulation to offer a safe, aesthetic, and preferred alternative to reliance on the automobile. The Project, however, does not specify the location of planned bicycle and pedestrian facilities. The Project should ensure consistency with the *City of Manteca Bicycle Master Plan* (2003), which specifies that a Class I bicycle path is planned along Atherton Drive through the Project study area and along McKinley Avenue north of Atherton Drive. Because the Project description does not describe any planned bicycle facilities, the Project could create an inconsistency with policies related to bicycle systems. Mitigation Measure 3.13-6 would ensure consistency with the applicable plans. Consequently, with implementation of mitigation, this impact would be reduced to a **less than significant** level.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-6.***

Impact 3.13-24: Under Cumulative conditions, the proposed Project would adversely affect transit services or facilities. (Less than Significant with Mitigation)

The proposed Project includes 975 single-family residential dwelling units, 290 multi-family residential dwelling units, and over 200,000 square feet of commercial space that could potentially increase transit ridership on Manteca Transit Bus Routes 1, 2, and 3. This increase in transit ridership would potentially impact a stop on Daniels Street, located approximately two miles from the Project site. A typical walkshed to access transit facilities is ½ mile. Therefore, because the nearest bus stop is greater than the typical walkshed to access transit facilities, this impact is considered potentially significant. It is noted that the Project, however, would not disrupt or interfere with existing or planned public transit services or facilities.

Mitigation Measure 3.13-7 would require consistency with policies concerning transit systems set forth in the Manteca Transit Short Range Transit Plan (2014), the SCJOG RTP/SCS, and the City of Manteca General Plan. Therefore, with implementation of the following mitigation, the proposed Project would have a **less than significant** impact.

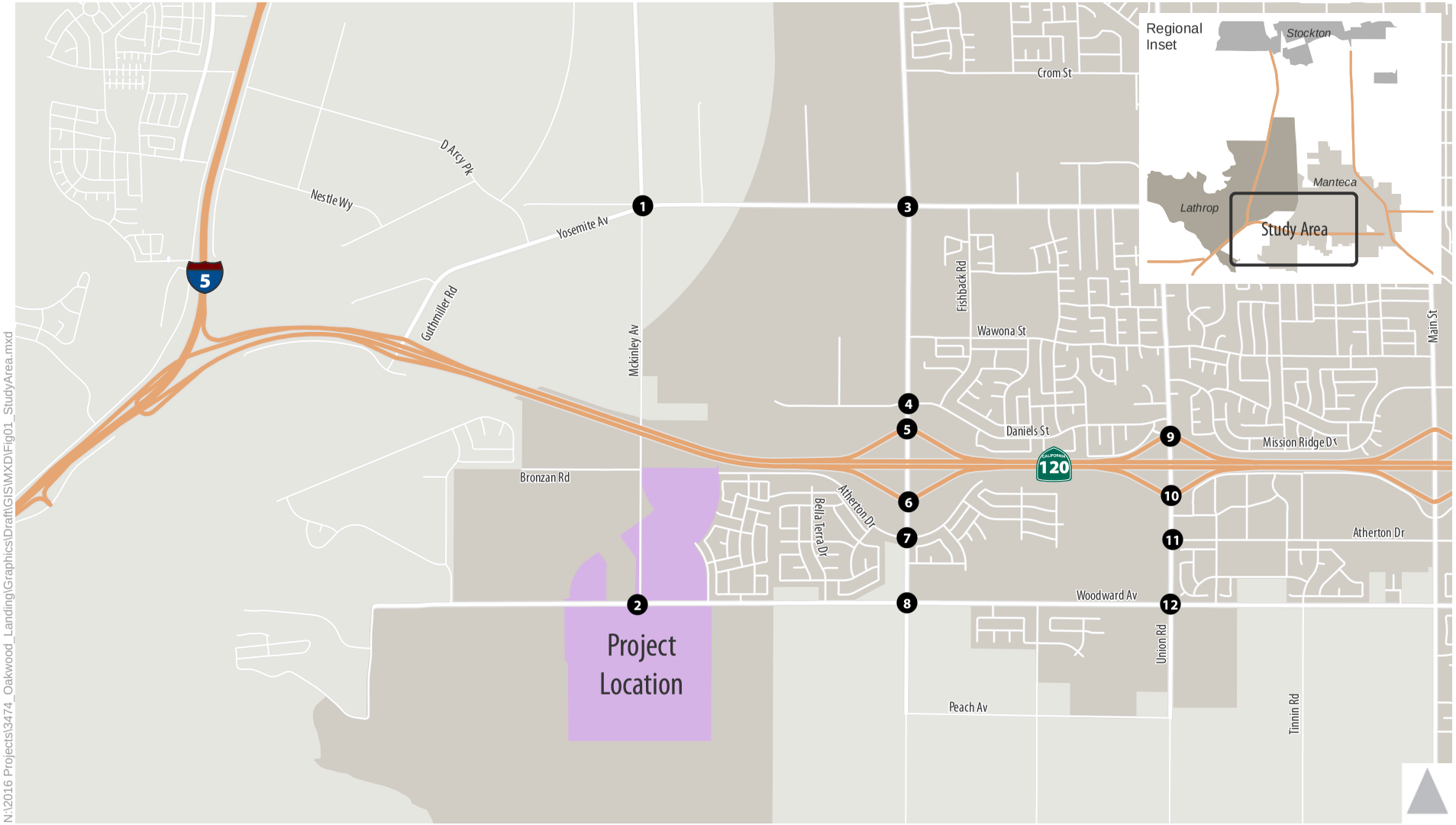
MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-7.***

Impact 3.13-25: Under Cumulative conditions, the proposed Project could cause potentially significant impacts to at-grade rail crossings. (Less than Significant)

Yosemite Avenue and McKinley Avenue each feature at-grade crossings of a UPRR railroad track. The Project would add about 200 AM peak hour trips and 600 PM peak hour trips to the McKinley Avenue crossing and about 20 AM peak hour trips and 40 PM peak hour trips to the Yosemite Avenue crossing. Each crossing has advanced warning signs, railroad crossing pavement markings, stop lines, crossing gates, flashing lights, and warning bells. Additionally, the Project would not add traffic to an at-grade crossing with a known safety problem. Therefore, this impact is considered **less than significant**.

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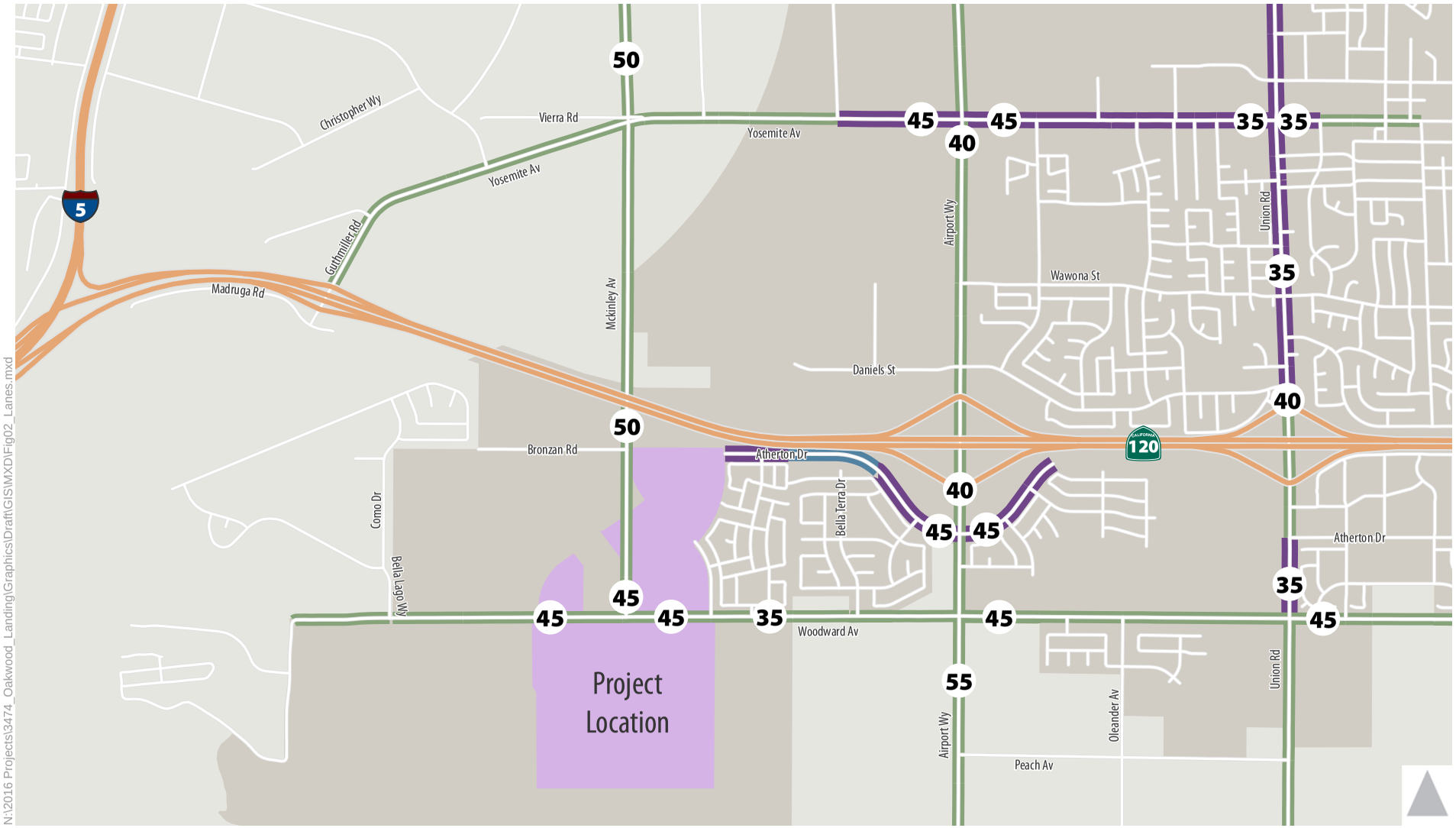
1 Study Intersection

Project Location

Figure 3.13-1

Study Area

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Project Location

50 Posted Speed Limit

Number of Lanes

- 2
- 3
- 4

Figure 3.13-2

Existing Number of Lanes and Posted Speed Limits

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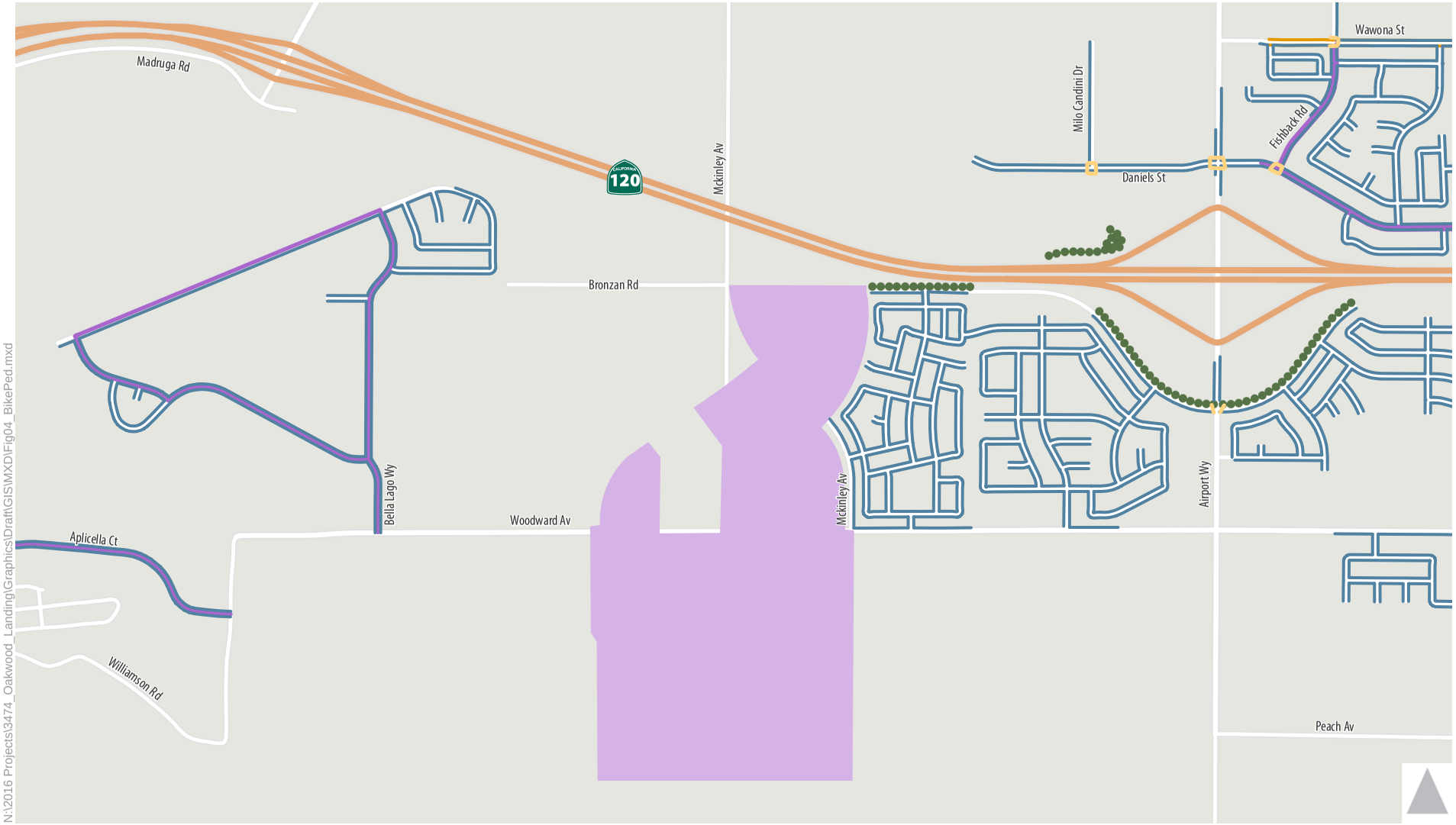


Figure 3.13-3

Existing Bicycle & Pedestrian Facilities

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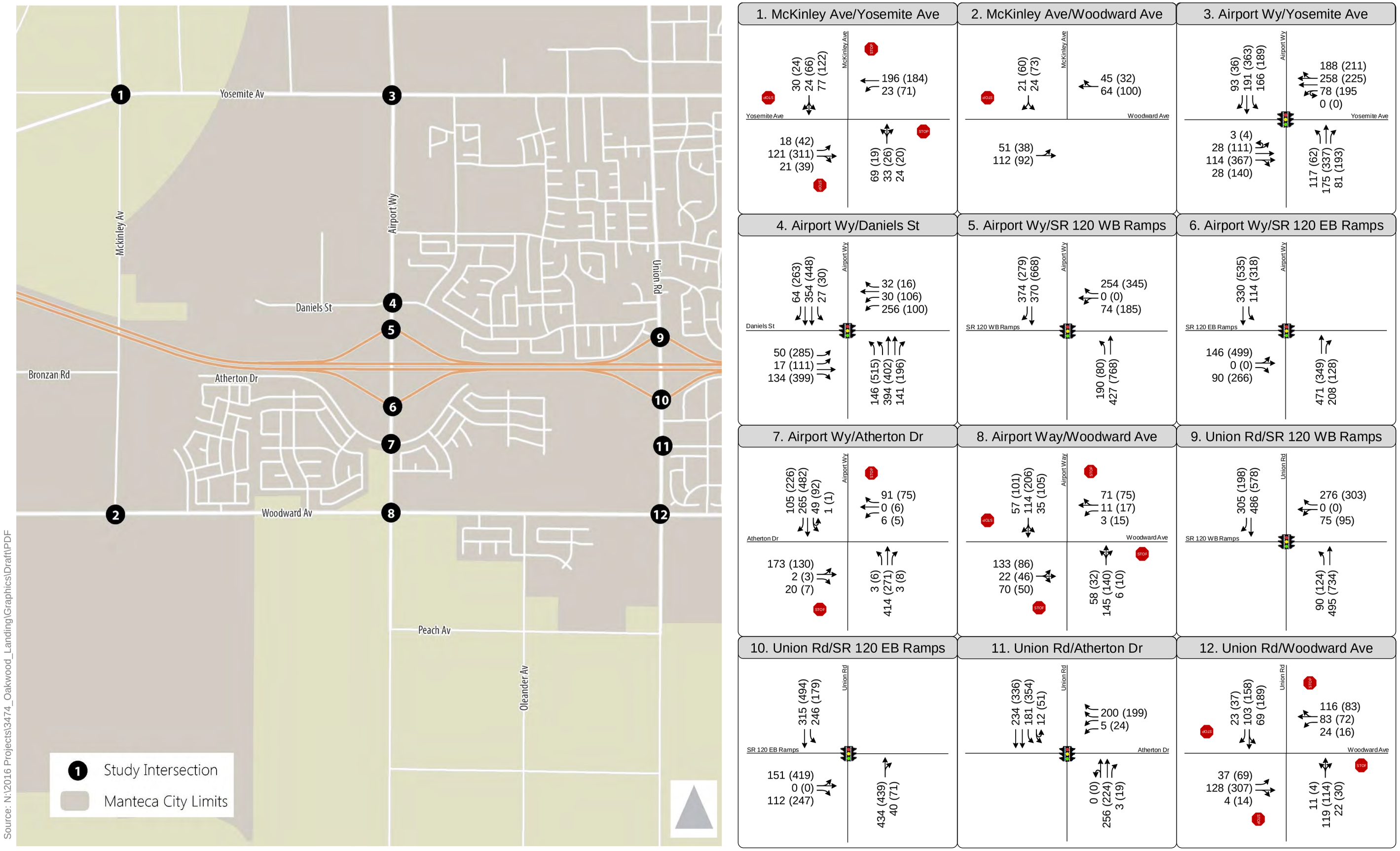
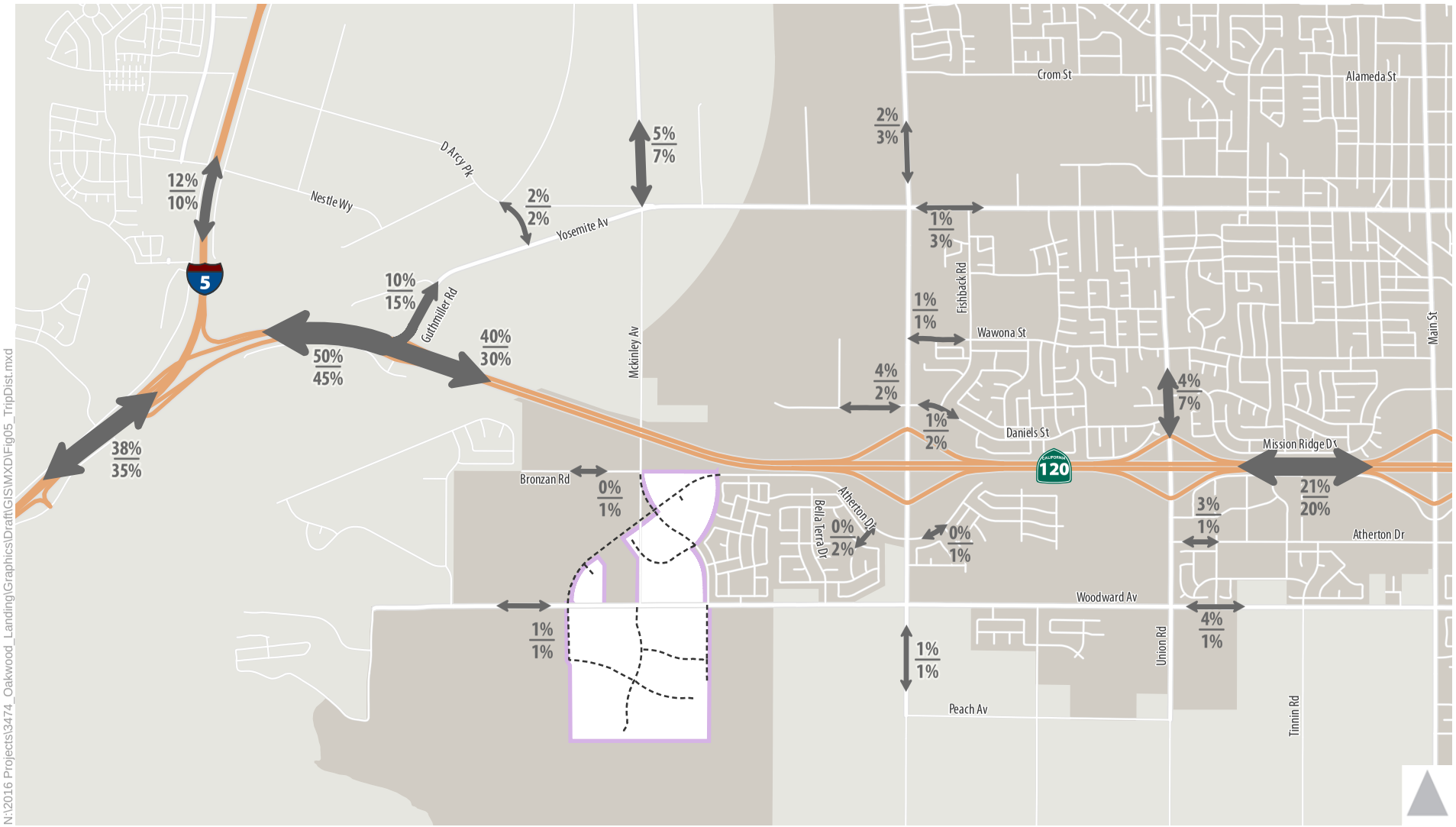


Figure 3.13-4
Peak Hour Traffic Volumes and
Lane Configurations - Existing Conditions

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10% Residential Trip Distribution
10% Commercial Trip Distribution

Planned Roadway

Project Location

Figure 3.13-5

Project Trip Distribution Under Existing Conditions

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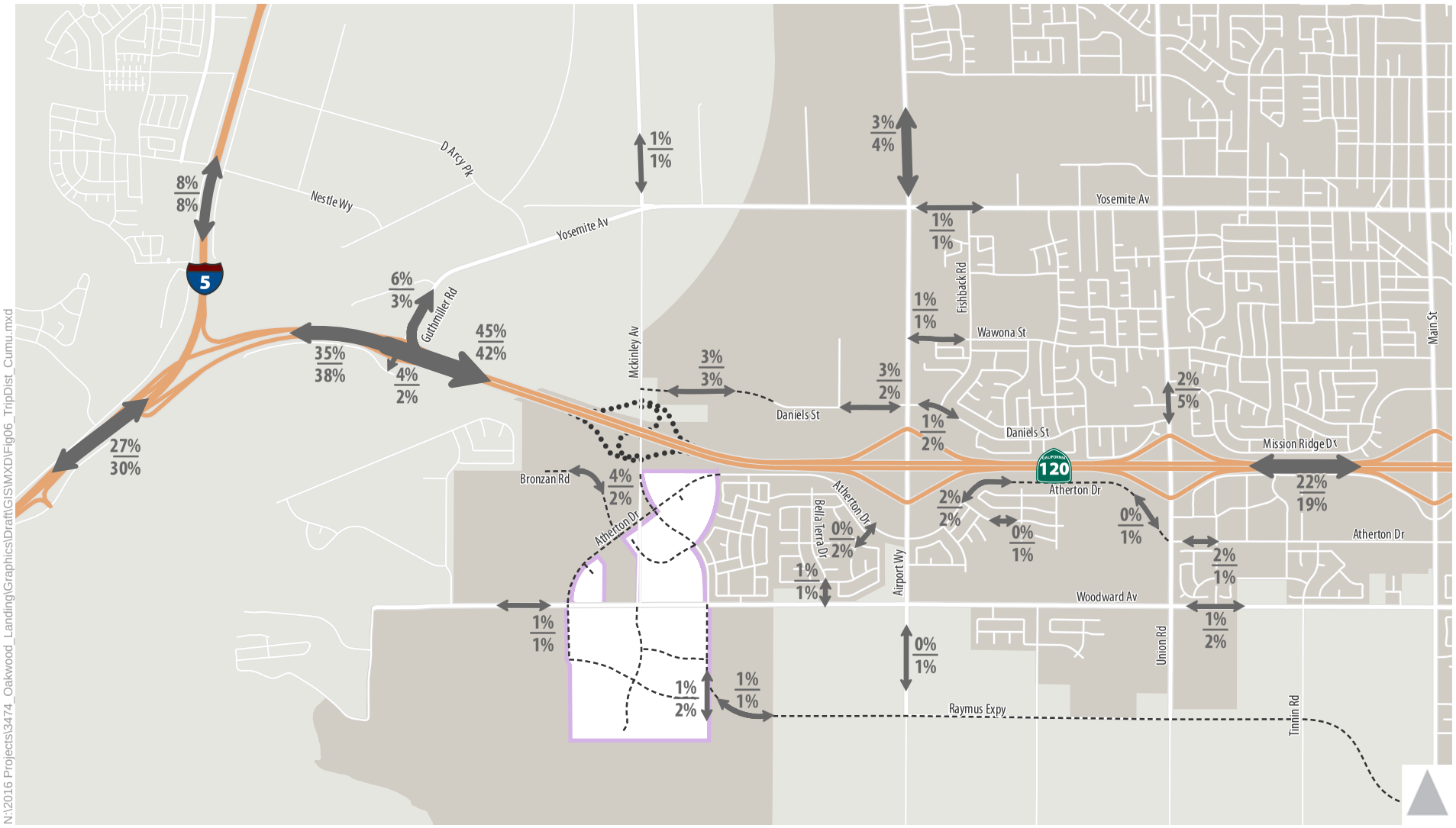
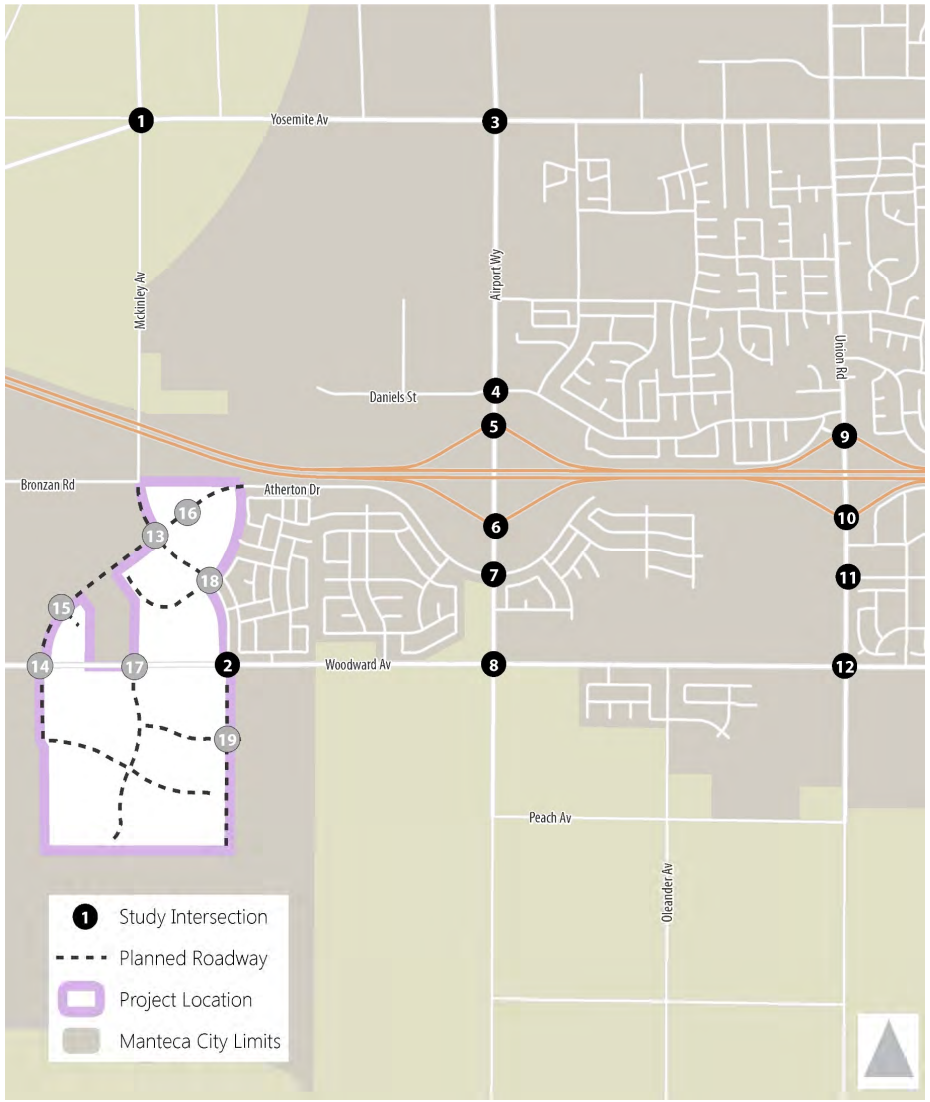


Figure 3.13-6

Project Trip Distribution Under Cumulative Conditions

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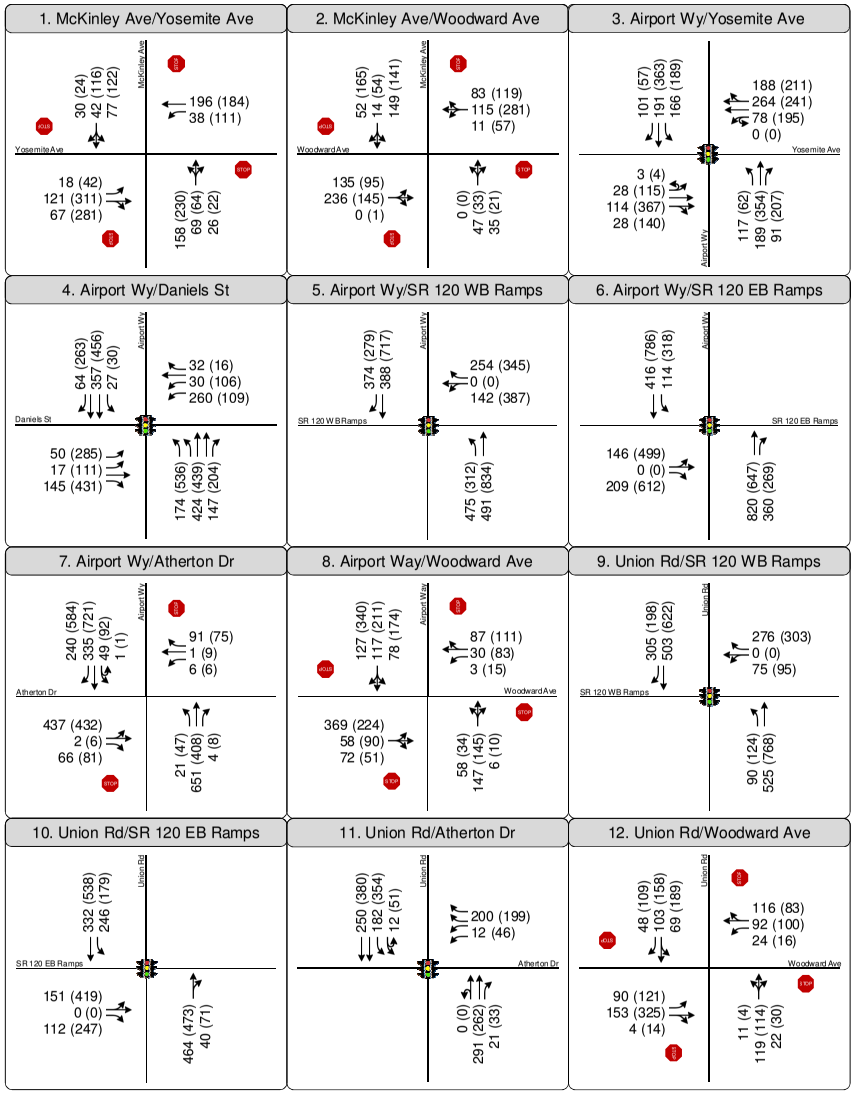
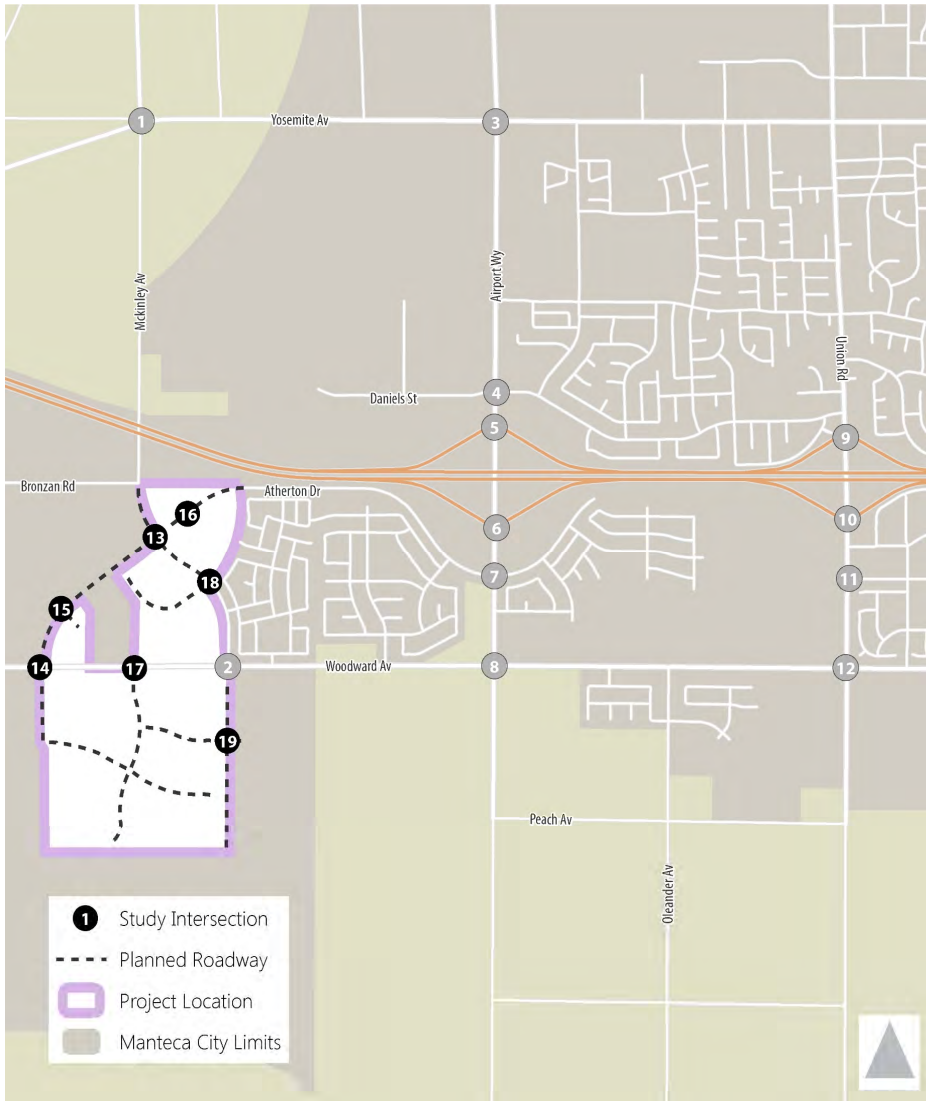


Figure 3.13-7a
Peak Hour Traffic Volumes and
Lane Configurations - Existing Plus Project

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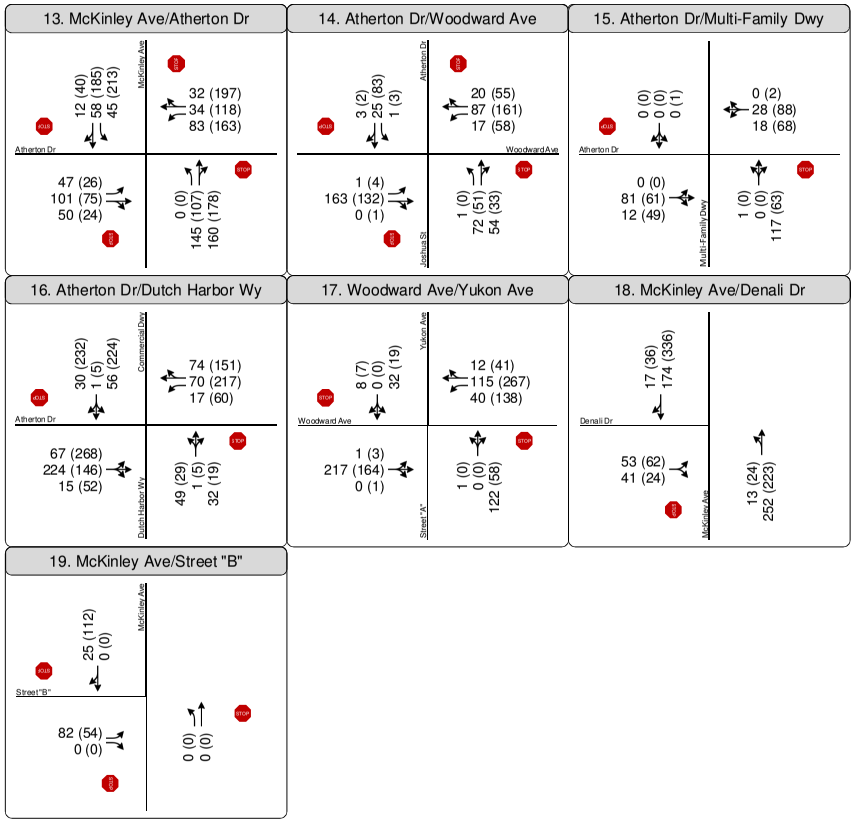


Figure 3.13-7b
Peak Hour Traffic Volumes and
Lane Configurations - Existing Plus Project

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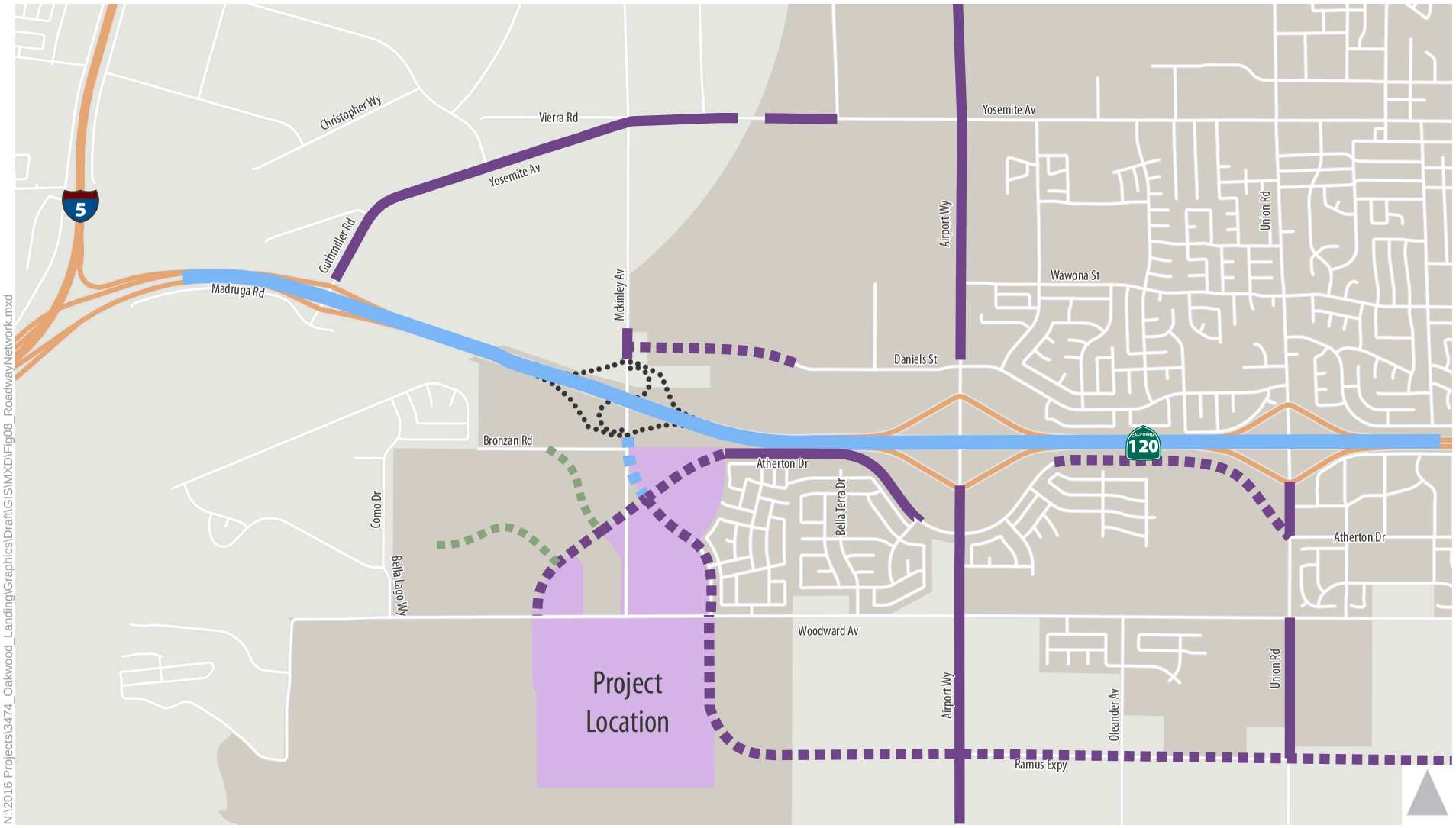
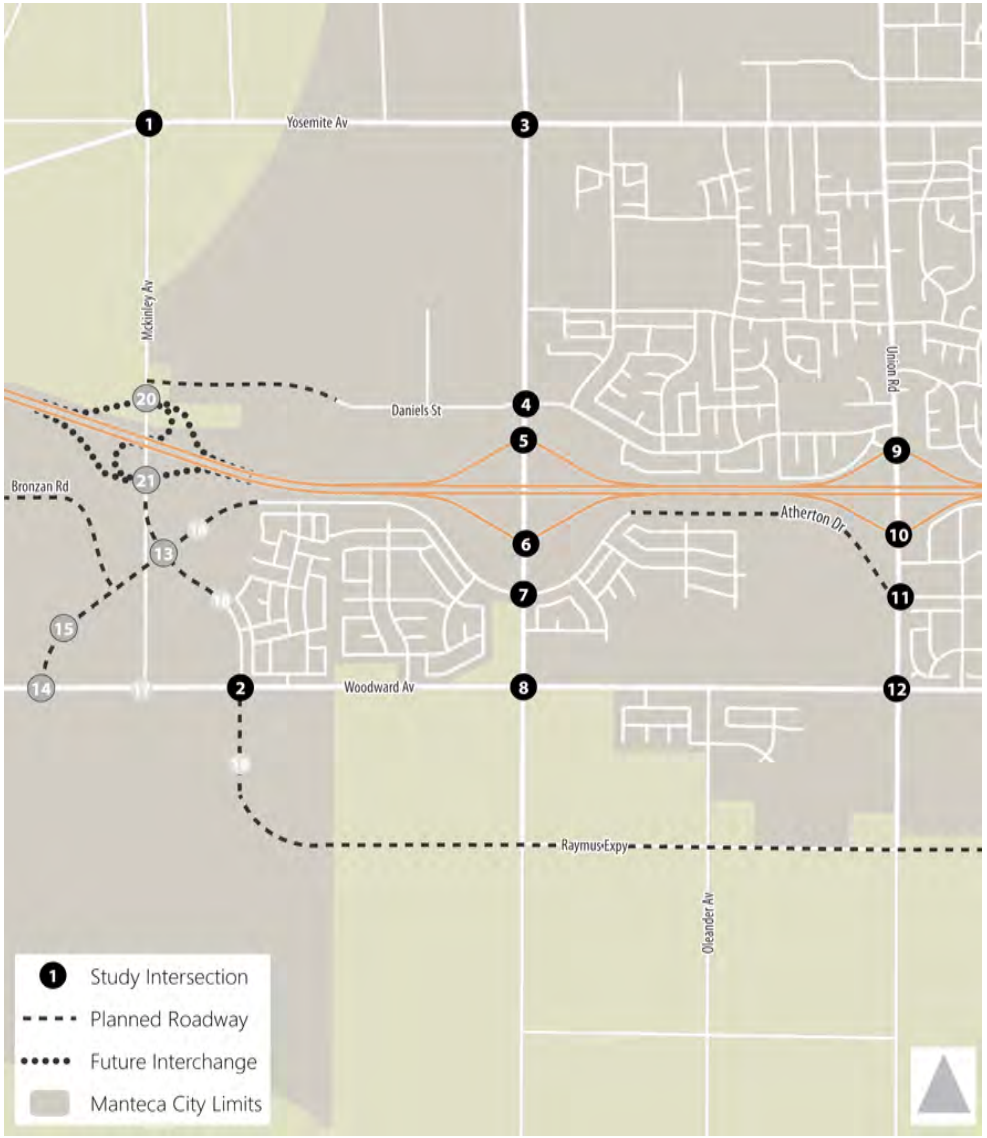


Figure 3.13-8

Cumulative Roadway Network

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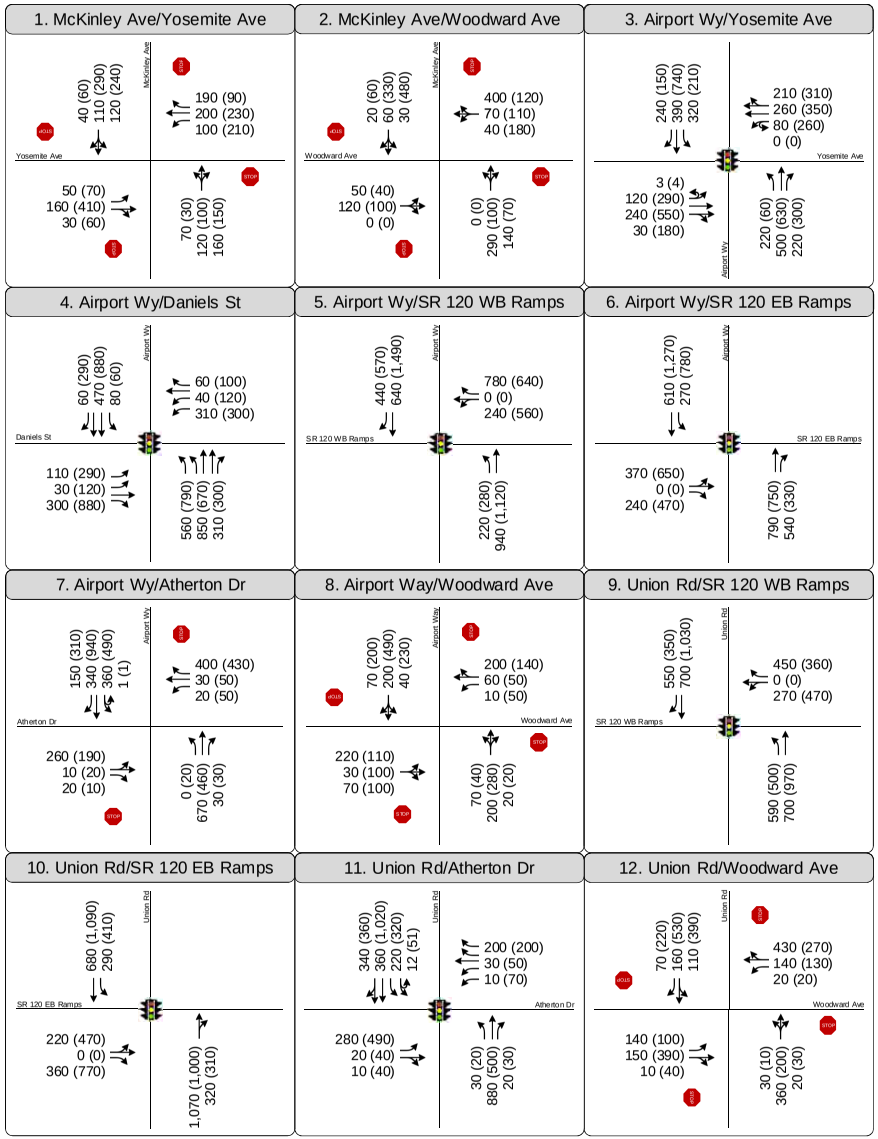
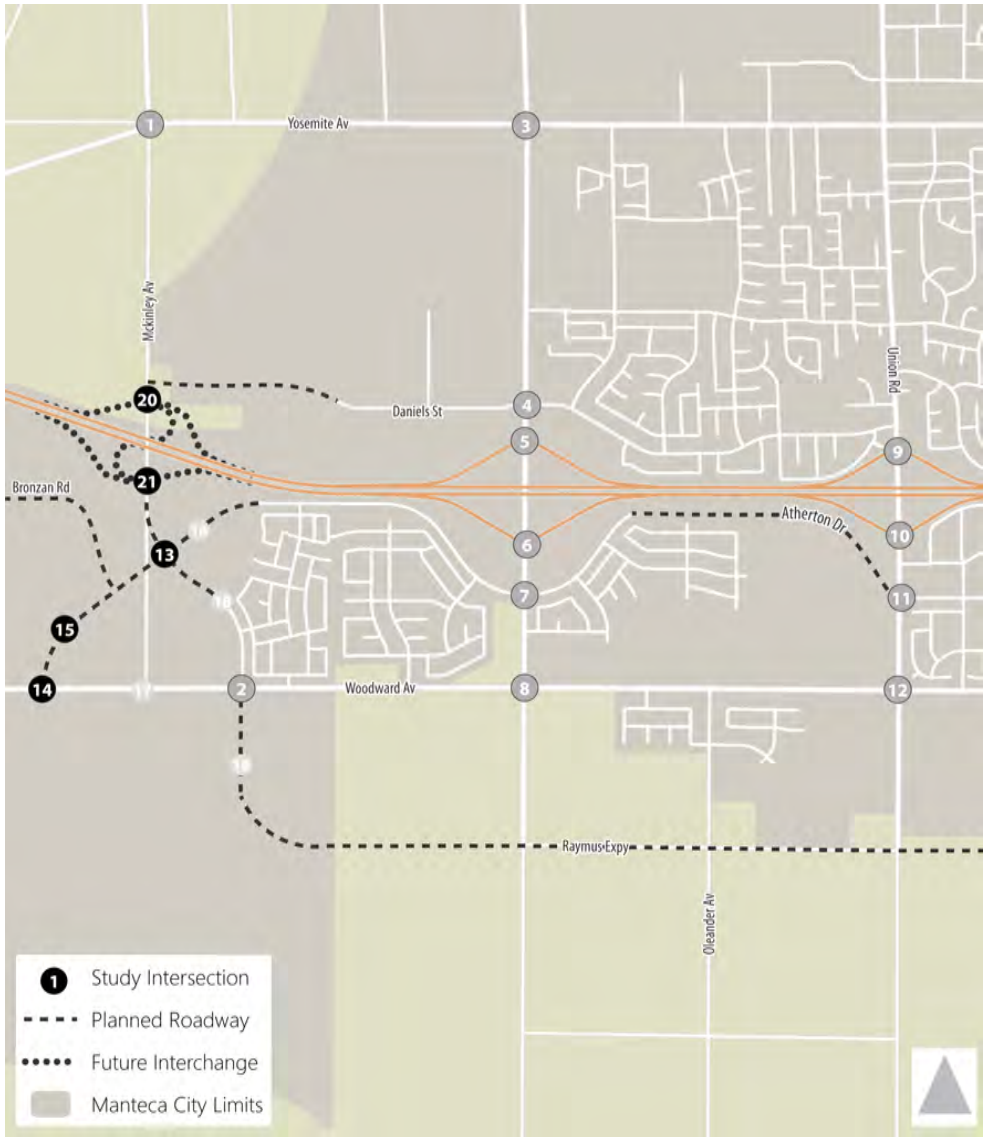


Figure 3.13-9a
Peak Hour Traffic Volumes and Lane Configurations
Cumulative No Project Conditions

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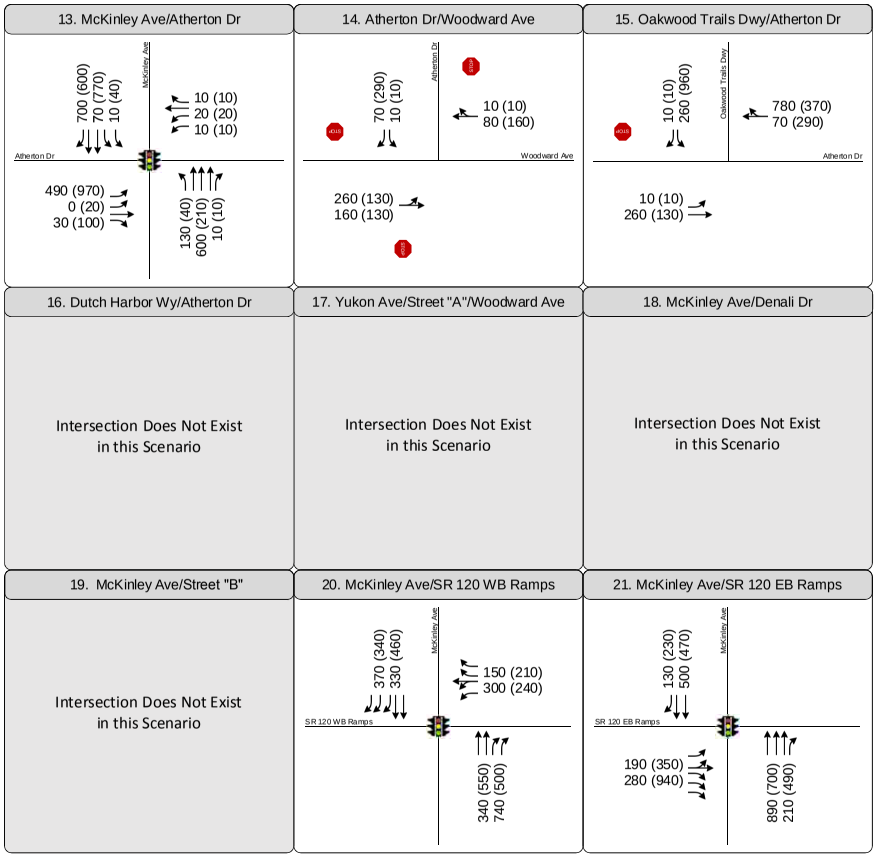
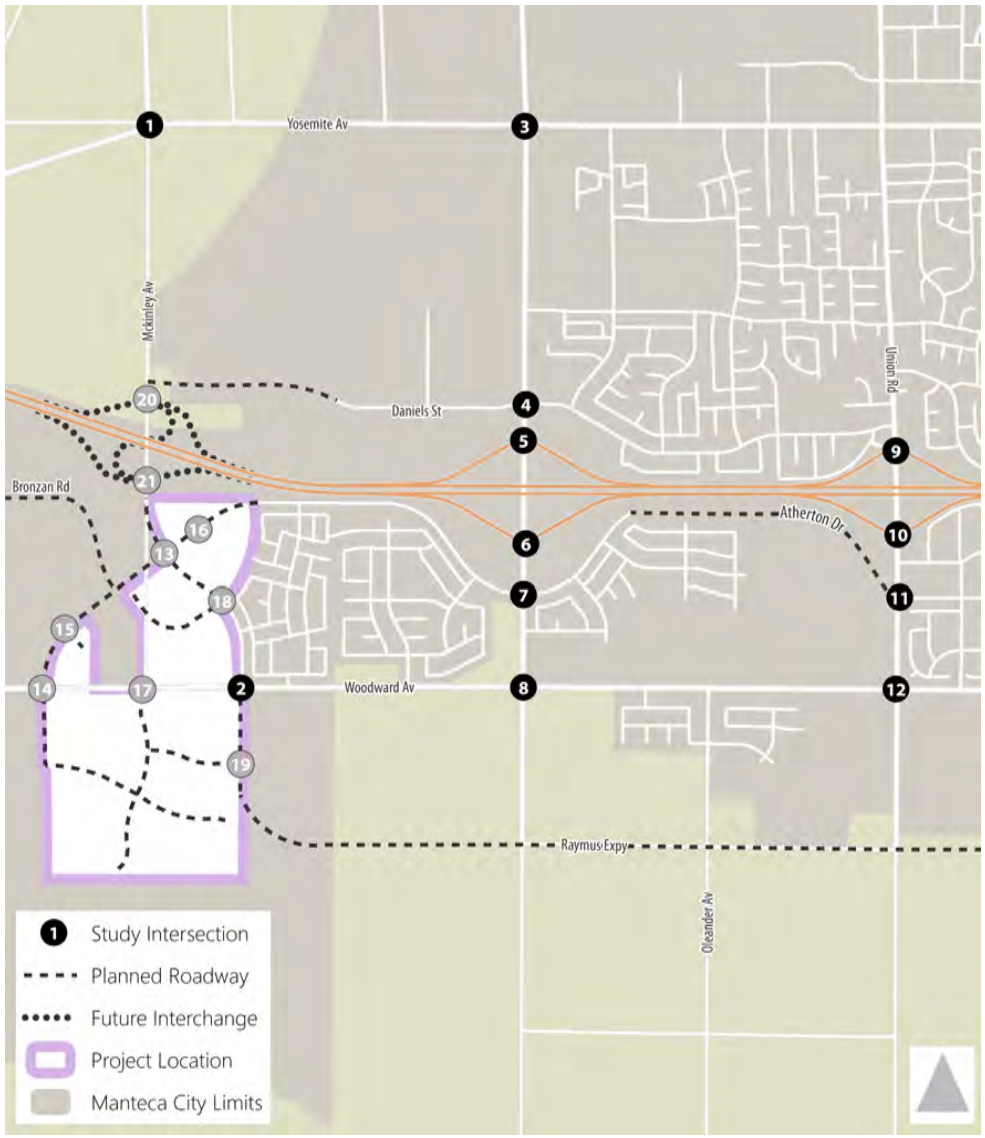


Figure 3.13-9b
Peak Hour Traffic Volumes and Lane Configurations
Cumulative No Project Conditions

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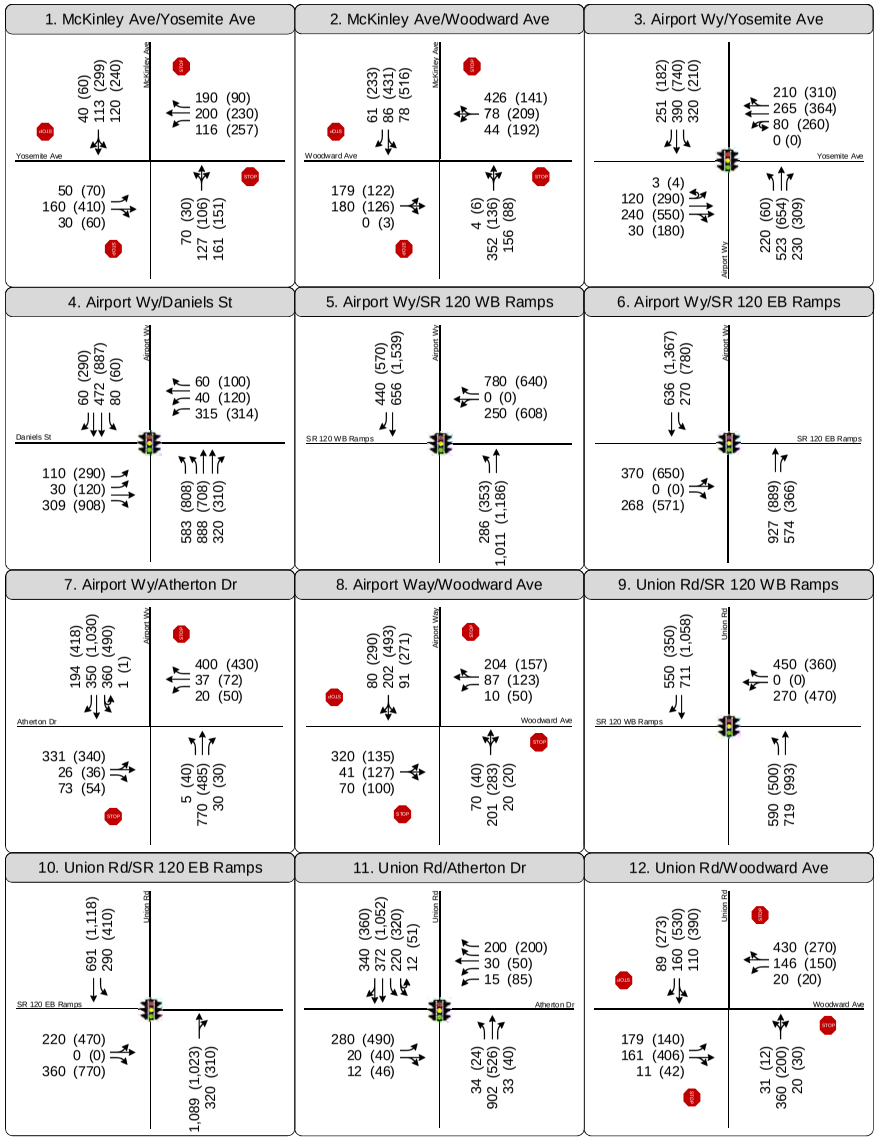
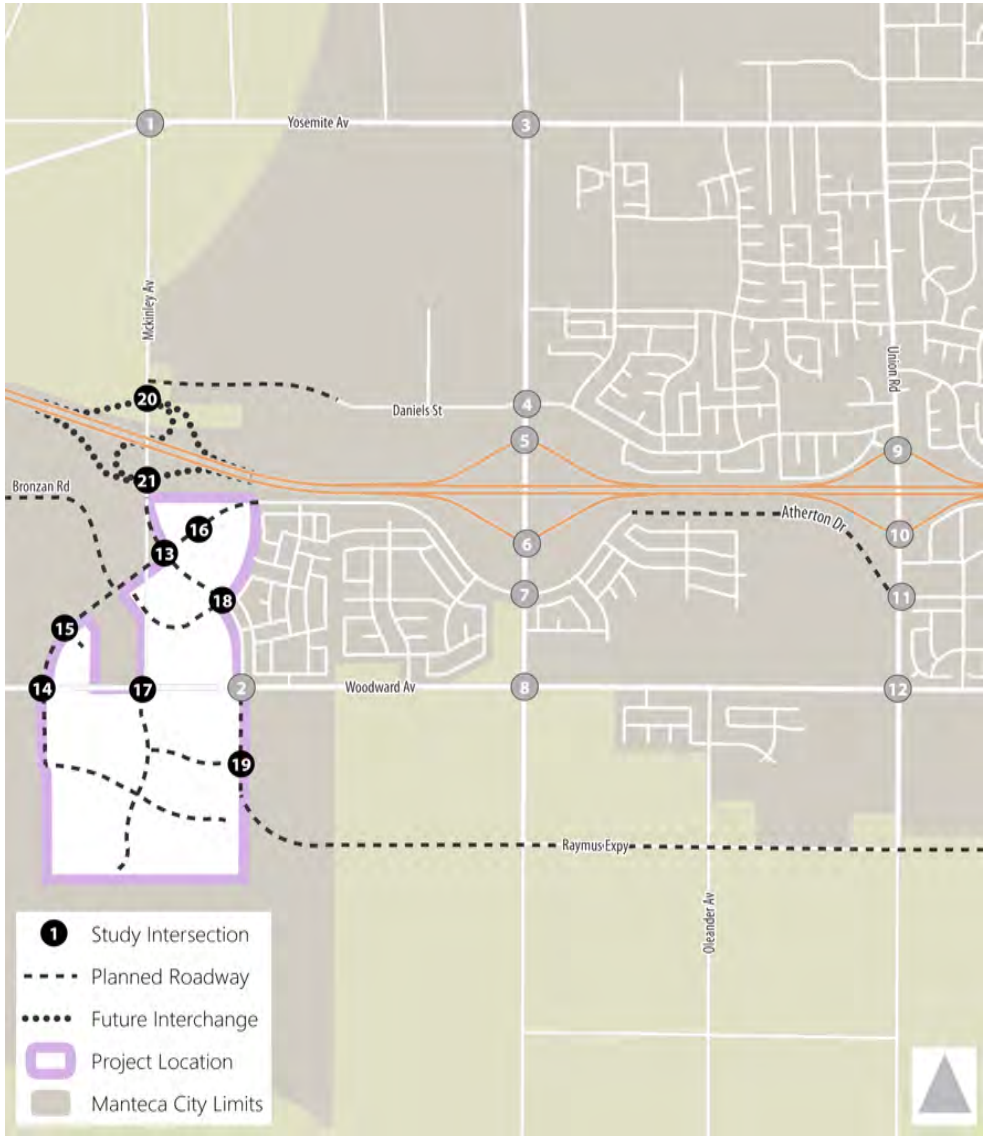


Figure 3.13-10a
Peak Hour Traffic Volumes and Lane Configurations
Cumulative Plus Project Conditions

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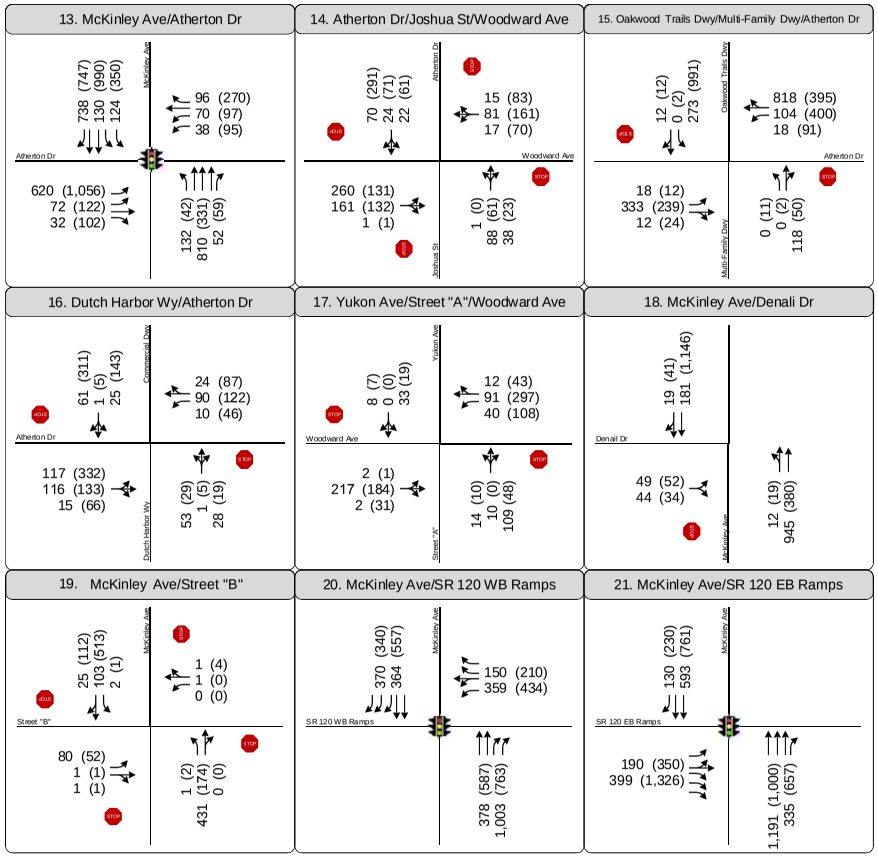


Figure 3.13-10b
Peak Hour Traffic Volumes and Lane Configurations
Cumulative Plus Project Conditions

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This section describes the regulatory setting, impacts associated with wastewater services, water services, storm drainage, and solid waste disposal that are likely to result from Project implementation, and measures to reduce potential impacts to wastewater, water supplies, storm drainage, and solid waste facilities. This section is based in part on the following documents, reports, and studies: *California's Groundwater,* CalRecycle *Solid Waste Information System,* CalRecycle *Jurisdiction Diversion/Disposal Rate Summary*, *Manteca Municipal Services Review* (City of Manteca, 2008), the *San Joaquin Groundwater Basin Groundwater Management Plan*, *South County Surface Water Supply Project EIR* (South San Joaquin Irrigation District [SSJID], 1999), *Urban Water Management Plan* (2005), *Water Master Plan* (2005), *Storm Drain Master Plan* (2013) *Wastewater Collection System Master Plan* (2012), *Wastewater Quality Control Facility Master Plan Update* (2006), *Draft Sewer Rate Study* (2008), and *Water Supply Assessment for Oakwood Landing* (West Yost Associates, 2016). Comments were received during the public review period for the Notice of Preparation from the Central Valley Regional Water Quality Control Board.

3.14.1 WASTEWATER SERVICES

ENVIRONMENTAL SETTING

Wastewater service is provided by the City of Manteca via their network of collection infrastructure and the Wastewater Quality Control Facility (WQCF), which is located north of the Project site at 2450 West Yosemite Avenue. The WQCF provides services to the City of Manteca, City of Lathrop, and Raymus Village in San Joaquin County. As of 2015, the WQCF treated approximately 6.5 million gallons per day (mgd) of wastewater with a maximum capacity of 9.87 mgd as of 2015.

Wastewater Conveyance

The existing wastewater collection system is owned and operated by the City of Manteca Public Works Department. The use of gravity sewers for the collection system is the preferred method of conveyance. Although initially more expensive due to larger size and depth of installation, gravity sewers tend to have lower operation and maintenance costs and a reduced risk of failure. The collection system in the city is comprised of gravity flow pipes sized between 6 and 36 inches. In places where topography is relatively flat or adverse for the use of gravity sewers, force mains ranging in size from 6 to 24 inches, and 11 wastewater pump stations are utilized.

GRAVITY SEWERS

The following standards are used in the design of gravity sewers. The minimum depth of cover is between 8 feet and 30 feet. Manholes are assumed every 400 feet for pipe diameters ranging from 8 inches to 18 inches, every 500 feet for pipe diameters ranging from 21 to 30 inch, and every 600 feet for pipe diameters larger than 30-inch. Manholes are also assumed at every junction or change in pipe diameter. Additionally, gravity sewer lines will be sized to flow 70-80 percent full, and pipe velocities will range from 2-6 feet per second (ft/sec).

FORCE MAINS

The following standards are used in the design of force mains. A minimum cover of 3 feet is required. Velocities will range from 2-6 ft/sec. Plug valves will be installed every 1,000 ft and at major crossings. Tracer wire will be provided. Force mains will be constructed of PVC, AWWA C900/C905.

WASTEWATER COLLECTION SYSTEM AT PROJECT SITE

An existing 12-inch sewer line is located adjacent along McKinley Avenue. Additionally, an existing 30-inch sewer line is located within to the Project site along Woodward Avenue.

Wastewater Treatment

Wastewater from the City is currently treated at the WQCF. The City owns and operates the WQCF. The City's *Wastewater Quality Control Facility Master Plan Update* (2006), *Manteca Municipal Services Review* (2008), *Wastewater Collection System Master Plan Update* (2012), and *Industrial Sewer System Service Charge Analysis* (2013-2015) are the primary documents that outline the City's long term strategy for meeting future discharge and capacity requirements for a planning horizon that extends to build-out of the General Plan. The City operates the facility under the Waste Discharge Requirements (WDRs) Order No R5-2015-0026 NPDES NO. CA0081558. Currently, the Facility is designed to provide a tertiary level of treatment for up to a design flow of 9.87 MGD. Therefore, this Order contains an average dry weather discharge flow effluent limitation of 9.87 MGD. The WQCF is currently being upgraded in order to expand the solids handling capacity of the WGCF. Upon compliance with Provision VI.C.6.b of Order No R5-2015-0026, an average dry weather discharge flow effluent limitation of 17.5 MGD will occur. [1] The plant is currently operating at 65% of capacity.[2]

WASTEWATER QUALITY

According to the *Wastewater Quality Control Facility Master Plan Update* (2006), the WQCF is a 6.95 mgd rated combined biofilter-activated sludge plant. Secondary effluent is land applied during the spring and summer (flood irrigation for agricultural production) and discharged to the San Joaquin River during the winter (October-March). The *Wastewater Quality Control Facility Master Plan Update* (2006) specifies that effluent from the WQCF typically do not exceed the quantities presented in Table 3.14-1 (Typical Effluent Quality Prior to Phase III Expansion Project).

[1] http://www.swrcb.ca.gov/rwqcb5/board_decisions/adopted_orders/san_joaquin/r5-2015-0026.pdf

[2] Personal Communication with Mark Houghton, City of Manteca Public Works Director. February 2017.

TABLE 3.14-1: TYPICAL EFFLUENT QUALITY PRIOR TO PHASE III EXPANSION PROJECT

CONSTITUENT	*UNITS*	*30 DAY AVERAGE*
BOD5	mg/L	16
SS	mg/L	0.1
TSS	mg/L	19
Total Coliform Organisms	MPN/100 mL	23"
Oil and Grease	mg/L	2.1
Chlorine Residual	mg/L	--
Ammonia	mg/L	0.20

SOURCE: WASTEWATER QUALITY CONTROL FACILITY MASTER PLAN UPDATE 2006, PG 2-2

The Manteca WQCF operates under Board Order Number R5-2015-0026 (NPDES Permit No. CA0081558). On April 17 2015, the Regional Board adopted Waste Discharge Requirements (WDR) Order No. R5-2015-0026, NPDES No. CA0081558, prescribing waste discharge requirements for the City of Manteca, City of Lathrop, and Dutra Farms at the WQCF in San Joaquin County.

TABLE 3.14-2: COMPARISON OF PROBABLE FUTURE WATER QUALITY LIMITATIONS VERSUS EFFLUENT QUALITY FOLLOWING PHASE III EXPANSION PROJECT

CONSTITUENT	*UNITS*	*COMPLIANCE CRITERIA*	*PROBABLE FUTURE LIMIT*	*PROJECTED EFFLUENT MEDIAN CONCENTRATION*
BOD	mg/L	Monthly Average	10 or lower	<10
Total Suspended Solids	mg/L	Monthly Average	10 or lower	<10
Total Coliform	MPN/100 mL	Weekly Average	2.2.	<2.2
Turbidity	NTU	1 Hour Average	2	<2
Settleable Solids	mg/L	Monthly Average	0.1	0.1
Chlorine Residual	mg/L	4-day Average	0.01	0.01
Oil and Grease	mg/L	Monthly Average	10	2.1
Aluminum	mg/L	Monthly Average	71	150
Electrical Conductivity	µmhos/cm	Monthly Average	1000	825
Ammonia [a]	mg/L	Monthly Average	2.1	2.1
Ammonia [b]	mg/L	Monthly Average	2.8	2.1
Arsenic	µg/L	Monthly Average	10	8
Copper	µg/L	Monthly Average	7.9	7
Cyanide	µg/L	Monthly Average	3.7	7
Iron	µg/L	Monthly Average	300	420
Manganese	µg/L	Monthly Average	50	33
MBAS	µg/L	Monthly Average	500	560
Nitrate (as N)	mg/L	Monthly Average	10	5
Nitrite (as N)	mg/L	Monthly Average	1	1
Bis (2-ethylhexyl) phthalate	ug/L	Monthly Average	22	3.48
Bromodichloromethane	ug/L	Monthly Average	5	ND [b]
Dibromochloromethane	ug/L	Monthly Average	1.4	ND [b]
2, 4, 6-Trichlorophenol	ug/L	Monthly Average	34	3.28

[a] June - September
[b] October - May

SOURCE: WASTEWATER QUALITY CONTROL FACILITY MASTER PLAN UPDATE 2006, PG 2-17

Future Demand

The City's *Wastewater Quality Control Facility Master Plan Update* projected future wastewater generation factors for various land uses. Based on these calculations it was estimated that the City will have future flows totaling 19.5 mgd as of the General Plan horizon of 2023 with a buildout capacity of 23.0 mgd.

According to the 2012 *Wastewater Quality Control Facility Master Plan Update*, residential WGFs for future development have been reduced to reflect upcoming water conservation legislation for residential development based on a generation factors study. The study also focuses on reduction of industrial and general commercial WGFs to reflect historical water use data from local businesses.

The overall collection sewer strategy will consist of a combination trunk sewer gravity collection system with pump or lift stations located along the alignment to convey wastewater to an influent pump station located at the City WQCF. The South Manteca Collection Strategy (SMCS) will collect flow from areas where future growth is expected. The continued use of existing pump stations and addition of pump and lift stations, allows for a reduction in the depth of the trunk sewers proposed in previous master plans.

Planned Infrastructure Upgrades

To account for the additional wastewater flows in the Project area after the construction of the proposed Project, additions to the existing wastewater infrastructure will be needed. The sanitary sewer collection will be by an underground collection system installed as per the City of Manteca standards and specifications. Sanitary sewer disposal will flow to the City of Manteca WQCF for treatment.

As shown in Figure 2.0-11 in Section 2.0, development areas proposed by the Project would be served by a new wastewater distribution system. As shown in Figure 2.0-11, a temporary sewer lift station would be developed in the northern corner of the park/basin area within the Cerri subdivision. The proposed wastewater conveyance facilities would connect to the existing and planned City of Manteca collection and treatment system. For example, as shown in Figure 2.0-11, sewer within the Cerri subdivision would connect to the “Trail of Manteca” Project regional sewer lift station adjacent west of the Project site.

REGULATORY SETTING

Clean Water Act (CWA) / National Pollutant Discharge Elimination System (NPDES) Permits

The CWA is the cornerstone of water quality protection in the United States. The statute employs a variety of regulatory and non-regulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical,

physical, and biological integrity of the nation's waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

The CWA regulates discharges from "non-point source" and traditional "point source" facilities, such as municipal sewage plants and industrial facilities. Section 402 of the Act creates the NPDES regulatory program which makes it illegal to discharge pollutants from a point source to the waters of the United States without a permit. Point sources must obtain a discharge permit from the proper authority (usually a state, sometimes EPA, a tribe, or a territory). NPDES permits cover industrial and municipal discharges, discharges from storm sewer systems in larger cities, storm water associated with numerous kinds of industrial activity, runoff from construction sites disturbing more than one acre, mining operations, and animal feedlots and aquaculture facilities above certain thresholds.

Permit requirements for treatment are expressed as end-of-pipe conditions. This set of numbers reflects levels of three key parameters: (1) biochemical oxygen demand (BOD), (2) total suspended solids (TSS), and (3) pH acid/base balance. These levels can be achieved by well-operated sewage plants employing "secondary" treatment. Primary treatment involves screening and settling, while secondary treatment uses biological treatment in the form of "activated sludge."

All so-called "indirect" dischargers are not required to obtain NPDES permits. An indirect discharger is one that sends its wastewater into a city sewer system, so it eventually goes to a sewage treatment plant. Although not regulated under NPDES, "indirect" discharges are covered by another CWA program called pretreatment. "Indirect" dischargers send their wastewater into a city sewer system, which carries it to the municipal sewage treatment plant, through which it passes before entering surface water.

The City's current NPDES Permit, which regulates the wastewater effluent quantity and quality upon discharge, was issued by the Central Valley Regional Water Quality Control Board and is Order R5-2006-0094 and Order 5-01-251.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act is California's statutory authority for the protection of water quality. Under the Porter-Cologne Act, the State is required to adopt policies, plans, and objectives that will protect the State's waters for the use by and enjoyment of Californians. In California, the State Water Resources Control Board (SWRCB) has the authority and responsibility for establishing policy related to the State's water quality. Regional authority is delegated by the SWRCB to a Regional Water Quality Control Board (RWQCB). The Porter-Cologne Act authorizes the SWRCB and RWQCB to issue NPDES permits.

Under the Central Valley Regional Water Quality Control Board (CVRWQCB) NPDES permit system, all existing and future municipal and industrial discharges to surface water within the city would be subject to regulation. NPDES permits are required for operators of municipal separate storm sewer systems, construction projects, and industrial facilities. These permits contain limits on the amount of pollutants that can be contained in each facility's discharge.

City of Manteca General Plan

GOAL: SEWER

- PF-8. Maintain an adequate level of service in the City's sewage collection and disposal system to meet the needs of existing and projected development.

POLICIES: SEWER

- PF-P-18. Ensure wastewater collection and treatment for all development in the City and the safe disposal of wastes.
- PF-P-19. The City will maintain capacity to process combined residential, commercial, and industrial flow.
- PF-P-20. The City shall develop new sewage treatment and trunk line capacity as necessary to serve new development.
- PF-P-21. City sewer services will not be extended to unincorporated areas, except in extraordinary circumstances. Existing commitments for sewer service outside the city limits shall continue to be honored.
- PF-P-22. Development of individual septic systems may be allowed only where the City makes a finding that it cannot feasibly provide public sewer service, and such systems shall only be used until such time as City sewer service becomes available. Such systems shall meet the minimum standards of the San Joaquin County Health Department.
- PF-P-23. The City shall establish and maintain a growth management plan to ensure the development of a balanced mix of residential, commercial, industrial, and public land uses.
- PF-P-24. Ensure that all new development provides for and funds a fair share of the costs for adequate sewer distribution, including line extensions, easements, and plant expansions.
- PF-P-25. The City will maintain the ability to handle peak discharge flow while meeting State Regional Water Quality Control Board Standards as established in the current NPDES Permit.

IMPLEMENTATION: SEWER

- PF-I-8. The City shall update the Public Facilities Implementation Plan regarding wastewater collection and treatment every five years. The update shall be reviewed annually for adequacy and consistency with the General Plan.
- PF-I-9. The City will require all sewage generators within its service area to connect to the City's system, except those areas where on-site treatment and disposal facilities are deemed appropriate.
- PF-I-10. The City will encourage and permit an industrial pretreatment program for business parks and other industrial uses in accordance with state and federal requirements.
- PF-I-11. The City will investigate methods of improving the quality of the effluent from the City plant and will investigate options for reuse of treated wastewater. The recycled

wastewater will be used for irrigation of public recreation lands, restoration of wetland areas, and irrigation of landscaped areas.

- PF-I-12. The City will promote reduced wastewater system demand through efficient water use by:

  - requiring water conserving design and equipment in new construction,
  - encouraging retrofitting with water conserving devices,
  - designing wastewater systems to minimize inflow and infiltration to the extent economically feasible; and
  - maintaining a Citywide map of all sewer collection system components and monitoring the condition of the system on a regular basis.

GOAL: WATER CONSERVATION

- RC-2. Maximize the beneficial uses of water by recycling water for irrigation and other non-potable uses.

POLICIES: WATER CONSERVATION

- RC-P-1. The City shall continue to implement water conservation standards for all commercial and industrial development, and for all existing and new residential development.
- RC-P-2. The City shall explore potential uses of treated wastewater when such opportunities become available.
- RC-P-3. The City shall protect the quantity of Manteca's groundwater.
- RC-P-4. The City shall require water conservation in both City operations and private development to minimize the need for the development of new water sources.
- RC-P-5. Development of private water wells within the city limits shall be allowed only where the City makes a finding that municipal water service is not readily and feasibly available, and such private well systems shall only be allowed to be used until such time as City water service becomes available.

IMPLEMENTATION: WATER CONSERVATION

- RC-I-1. Continue to implement standards for water conserving landscape practices, including the use of drought tolerant plants, for both public and private projects.
- RC-I-2. Continue efforts to increase public participation in water conservation.
- RC-I-3. Require large commercial and industrial water users to submit a use and conservation plan as part of the project entitlement review and approval process, and develop a program to monitor compliance with and effectiveness of that plan.
- RC-I-4. Cooperate with other agencies and jurisdictions to expand water conservation programs, and to develop methods of water reuse.
- RC-I-5. Actively pursue the use of treated wastewater in irrigation and industrial applications, including development of appropriate infrastructure.

City of Manteca Municipal Code

The City of Manteca Municipal Code, Title 13 (Public Services) Chapter 13.12 (Sewer Connection Charges), Chapter 13.14 (Sewer Capacity Charges), and Chapter 13.16 (Sewer Service Charges) contain regulations associated with sewer management.

Title 13 (Public Services), Chapter 13.38 (Public Facilities Implementation Program Fees), Section 13.38.050 (Establishment of a Sewer Fee) requires developers of property to pay a sewer facility development fee.

Utility Master Plans

The City of Manteca maintains a variety of Master Plan documents that guide the design, development, and maintenance of the utilities within the city limits. These include: *Urban Water Management Plan* (2015), *Water Master Plan* (2005), *Storm Drain Master Plan* (2013) *Wastewater Collection System Master Plan* (2012), *Wastewater Quality Control Facility Master Plan Update* (2006), *Draft Sewer Rate Study* (2008).

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the proposed Project will have a significant impact on the environment associated with Utilities if it will:

1. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board.

2. Require or result in the construction of new wastewater treatment and/or collection facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

3. Result in a determination by the wastewater treatment and/or collection provider which serves or may serve the Project that is does not have adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments.

IMPACTS AND MITIGATION MEASURES

Impact 3.14-1: The proposed Project has the potential to exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board. (Less than Significant)

WASTE DISCHARGE REQUIREMENTS (WDRS) BOARD ORDER NUMBER NO R5-2015-0026 (NPDES PERMIT NO. CA0081558).

The City of Manteca owns and operates a wastewater collection, treatment, and disposal system, and provides sanitary sewerage service to the City of Manteca and a portion of the City of Lathrop. On April 17, 2015, the RWQCB adopted Waste Discharge Requirements Order No. R5-2015-0026 NPDES NO. CA0081558, prescribing waste discharge requirements for the City of Manteca WQCF and allowing expansion of the plant up to 17.5 mgd.

The City of Manteca WQCF is a Publicly-Owned Domestic Wastewater Treatment Works. The Facility is divided into two parallel treatment systems, the north and south treatment systems. Primary treatment, which is identical in both systems, consists of mechanical screening, aerated grit removal, and primary sedimentation. The secondary treatment systems for both treatment systems are the same, which consists of conventional activated sludge, including nitrification-denitrification, followed by secondary sedimentation.

Grit and screenings are hauled offsite to a landfill for disposal. Sludge removed from primary and secondary sedimentation is thickened by dissolved air floatation, and then pumped to anaerobic digesters. After digestion, the treated sludge is dewatered by centrifuge, and then removed offsite for disposal in a privately-owned solid waste landfill.

Undisinfected secondary effluent is mixed with food processing waste and applied to agricultural fields that grow fodder and feed crops for dairy feed. Dischargers are responsible for maintaining the pipeline from the Facility to the agricultural fields.

Excess secondary effluent undergoes tertiary treatment through coagulation and flocculation, cloth media filtration, and ultraviolet light pathogen deactivation (UV Disinfection). Disinfected tertiary level treated effluent is discharged to the San Joaquin River. The San Joaquin River is a water of the United States, within the Sacramento-San Joaquin Delta. The Discharger also provides disinfected tertiary-level treated effluent for reuse for construction purposes (e.g. dust control).

The City of Manteca's wastewater treatment system is currently in compliance with the WDR requirements of Order No. R5-2015-0026 NPDES NO. CA0081558. The wastewater treatment system options covered under this Order include: City of Manteca WQCF including the collection system, basin/disposal fields, discharge to the San Joaquin River, and recycling conveyance and irrigation system. The development of the proposed Project under this permitted option would not exceed the wastewater discharge requirements in this Order. The proposed Project is anticipated to have a **less than significant** impact relative to this topic. The allocation of wastewater service capacity is discussed in the following impact topic.

Impact 3.14-2: The proposed Project has the potential to result in a determination by the wastewater treatment and/or collection provider which serves or may serve the Project that is does not have adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments. (Less than Significant with Mitigation)

The City's *Wastewater Quality Control Facility Master Plan Update* includes projected wastewater generation factors for various land uses. Based on these calculations it was estimated that the City will have future flows totaling 19.5 mgd as of the General Plan horizon of 2023 with a buildout capacity of 23.0 mgd. The study includes a reduction of industrial and general commercial wastewater generation factors to reflect historical water use data from local businesses.

The overall collection sewer strategy for the City of Manteca, including the proposed Project, consist of a combination trunk sewer gravity collection system with pump or lift stations located

along the collection system to convey wastewater to an influent pump station located at the City WQCF. The SMCS both collect flows from areas where future growth is expected.

According to the City's 2012 Wastewater Collection System Master Plan Update, Low Density Residential uses are estimated to generated 1,338 gallons per acre per day. The Project site includes 226.93 acres of Low Density Residential. Using this rate, the proposed Low Density Residential uses would generate 303,632 gallons per day (gpd) of wastewater. High Density Residential uses are estimated to generate 3,789 gallons per acre per day. The Project site includes 11.59 acres of High Density Residential. Using this rate, the proposed High Density Residential uses would generate 43,915 gpd of wastewater. General Commercial areas are estimated to generate 750 gallons per acre per day. The Project site includes 13.0 acres of General Commercial. Using this rate, the proposed General Commercial uses would generate 9,750 gpd of wastewater.

The total wastewater generated by the proposed Project is estimated to be 357,297 gpd. The proposed Project would increase the amount of wastewater requiring treatment. The wastewater would be treated at the WQCF. Occupancy of the proposed Project would be prohibited without sewer allocation. An issuance of sewer allocation from the City's available capacity would ensure that there would not be a determination by the wastewater treatment and/or collection provider that there is inadequate capacity to serve the proposed Project's projected demand in addition to the provider's existing commitments. Additionally, any planned expansion to the WQCF with a subsequent allocation of capacity to the proposed Project would ensure that there would not be a determination by the wastewater treatment and/or collection provider that there is inadequate capacity to serve the proposed Project's projected demand in addition to the provider's existing commitments. Implementation of Mitigation Measure 3.14-1 would reduce this potential impact to a **less than significant** level.

MITIGATION MEASURE(S)

Mitigation Measure 3.14-1: *Prior to occupancy of any building that would require wastewater treatment services, the Project proponent shall secure adequate wastewater treatment capacity/allocation.*

Impact 3.14-3: The proposed Project has the potential to require or result in the construction of new wastewater treatment or collection facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. (Less than Significant)

The wastewater collection and conveyance system that will serve the proposed Project will consist of engineered infrastructure consistent with the City's existing infrastructure requirements. Sizing of existing infrastructure in the City varies based on location, but generally includes gravity sewers and force mains ranging in size from 8 to 24 inches, and pump stations. The existing facilities have undergone environmental review and have waste discharge permits from the State.

New wastewater collection and conveyance infrastructure needed for the proposed Project will require trenching/excavation of earth, and placement of pipe within the trenches at specific

locations, elevations, and gradients. The location of the wastewater collection and conveyance infrastructure within the Project site is outlined in Figure 2.0-11 in Section 2.0. The applicant will refine the wastewater collection/conveyance infrastructure design through the development of improvements plans which undergo a review by the Community Development Department to ensure consistency with the City's engineering standards. This improvement plan process will include full engineering design (i.e., location, depth, slope, etc.) of all conveyance infrastructure as well as a review of new sewer pump stations and new force mains if needed. Ultimately, the sanitary sewer collection system will be an underground collection system installed as per the City of Manteca standards and specifications. Sanitary sewer disposal and treatment will be to the City of Manteca WQCF.

As shown in Figure 2.0-11, in Section 2.0, development areas proposed by the Project would be served by a new wastewater distribution system. As shown in Figure 2.0-11, a temporary sewer lift station would be developed in the northern corner of the park/basin area within the Cerri subdivision. The proposed wastewater conveyance facilities would connect to the existing and planned City of Manteca collection and treatment system. For example, as shown in Figure 2.0-11, sewer within the Cerri subdivision would connect to the "Trail of Manteca" Project regional sewer lift station adjacent west of the Project site.

The installation of the wastewater collection and conveyance system infrastructure to serve the proposed Project would have a **less than significant** impact relative to this topic. The wastewater treatment plant would not require upgrades or improvements in order to serve the proposed Project. Implementation of the proposed Project would have a **less than significant** impact relative to this topic.

3.14.2 WATER SUPPLIES

ENVIRONMENTAL SETTING

The Project site is located within the Manteca City limits. The City of Manteca will be the water purveyor for the proposed Project. The City's water system service area includes all areas within the city limits. The proposed Project, if approved by the City, is capable of being served by the City from the City's existing and future portfolio of water supplies. The water supply for the proposed Project will have the same water supply reliability and water quality as the water supply available to each of the City's other existing and future water customers.

The following information is contained in the *Water Supply Assessment for Oakwood Landing* (West Yost Associates, 2016). The City's most recently adopted *Urban Water Management Plan* (UWMP) (the City's 2015 UWMP) was adopted by the City Council on September 20, 2016. The City's 2015 UWMP included existing and projected water demands for existing and projected future land uses to be developed within the City's Sphere of Influence through 2030. The water demand projections in the City's 2015 UWMP included existing City water demands, future water demands for developments within the existing City limit, and future water demands for future service areas outside the existing City limit.

City of Manteca Water Service

This section presents the City's water service area including history and growth information for the City.

CITY OF MANTECA WATER SERVICE AREA

As described in the City's 2015 UWMP, the City is located in the flat plain at the northern end of California's San Joaquin Valley in south San Joaquin County. The City is located approximately 10 miles south of Stockton and 15 miles north of Modesto. Rich agricultural lands abut Manteca on the north, east, and south, while areas to the west are used primarily for industry. The Southern Pacific Railroad cuts the City diagonally from southeast to northwest. State Route 120 crosses the southern portion of the City and provides a connection between Interstate 5, located about four miles to the west of the City, and State Route 99 along the eastern boundary of the City. This location creates a good setting for Bay Area commuter housing as well as new commercial and industrial locations.

The City's 2015 UWMP Planning Area corresponds with the City SOI established in the City's 2023 General Plan. The 2023 General Plan includes a designation of area planned to be developed by 2023. The City's current water distribution service area coincides with the City limits. It is assumed that water supply will be extended to areas within the Planning Area outside the existing City limits as those areas are approved for development and annexed into the City.

Presently, the City limits encompass an area of about 13,400 acres. The total existing developed land is made up of approximately 64 percent residential land uses, 18 percent commercial, industrial, and institutional land uses, and 18 percent agriculture, parks, landscape, and other land

uses. Water demands not served by the City (e.g., agriculture, schools) rely on private groundwater wells and SSJID surface water for their supply.

CITY OF MANTECA CURRENT AND PROJECTED POPULATION

According to California Department of Finance data, between 1990 and 2015, the City of Manteca experienced an average annual population growth rate of 2.3 percent. During this period, peak population growth occurred between 2000 and 2005 with an average growth rate of over 4 percent. Recent population growth since 2010 averages about 1.5 percent per year.

By comparison, the City's boundary area has grown from about 6,300 acres in 1990 to about 13,400 acres in 2015, an annual average area growth rate of about 3.1 percent. The greatest growth in area occurred between 1990 and 2000. Since 2000, the City's area has grown about 1.8 percent per year.

The City has elected to use the 1990-2015 average annual population growth rate of 2.3 percent to project the population of the water service area through 2040. It is assumed that this population growth includes population acquired through City annexations of the surrounding area, as well as City infill development. The current and projected water service area populations for the City are summarized in Table 3.14-3.

TABLE 3.14-3: HISTORICAL AND PROJECTED POPULATION FOR CITY OF MANTECA WATER SERVICE AREA

CALENDAR YEAR	*ESTIMATED POPULATION*
2015	72,169
2020	80,900
2025	90,690
2030	101,660
2035	113,960
2040	127,740

SOURCE: CITY OF MANTECA 2015 UWMP, TABLE 3-1, POPULATION.

Proposed Project Water Demand and Supply

PROJECTED WATER DEMAND FOR THE PROPOSED PROJECT

The unit water use factors for the land use designations applicable to the proposed Project are shown in Table 3.14-4. The adjusted water use factors are the factors used throughout this assessment.

Potable water losses documented in the City's 2015 UWMP were calculated using a historical loss estimate of 12 percent of potable demands. The City anticipates that the implementation of advanced metering infrastructure (AMI) by 2018 will reduce losses to 8 percent by 2020, 7 percent by 2025, 6 percent by 2030, and 5 percent thereafter. Because the proposed Project is anticipated to have AMI, the Water Supply Assessment assumes that unaccounted-for-water (UAFW) will be 6 percent of the Project's potable demands.

TABLE 3.14-4: WATER USE FACTORS BY LAND USE TYPE

LAND USE DESIGNATION	WATER USE FACTOR, GPD/AC	
	2005 WATER MASTER PLAN[A]	ADJUSTED FOR SBX7-7[B]
High Density Residential (HDR)	6,500	5,200(b)
Low Density Residential (LDR)	2,800	2,240(b)
General Commercial (GC)	1,500	1,200(b)
Park (P)	4,000	3,600(c)

NOTES: GPD/AC = GALLONS PER DAY PER ACRES

[A] BASED ON UNIT WATER DEMAND FACTORS ESTABLISHED IN THE 2005 CITY OF MANTECA WATER MASTER PLAN.

[B] BASED ON A 20 PERCENT REDUCTION OF FACTORS SHOWN IN THE 2005 CITY OF MANTECA WATER MASTER PLAN.

[C] BASED ON A 10 PERCENT REDUCTION OF FACTORS SHOWN IN THE 2005 CITY OF MANTECA WATER MASTER PLAN.

SOURCE: WATER SUPPLY ASSESSMENT FOR OAKWOOD LANDING (WEST YOST ASSOCIATES, 2016).

Based on the water use factors shown in Table 3.14-4 and a UAFW of 6 percent, the projected water demand for the Project is shown in Table 3.14-5. As indicated in Table 3.14-5, the total projected annual potable water demand for the Project is projected to be 762 AFY.

TABLE 3.14-5: PROJECTED WATER DEMAND FOR BUILDOUT OF THE PROPOSED PROJECT

LAND USE	GROSS AREA (ACRES)	DWELLING UNITS (DU)	WATER USE FACTOR		POTABLE WATER DEMAND (AFY)
High Density Residential	11.59	290	208[a]	gpd/DU	68
Low Density Residential	210.87	975	521[b]	gpd/DU	569
General Commercial	13	--	1,200	gpd/ac	17
Park	16.06	--	3,600	gpd/ac	65
Open Space	6.77	--	0[c]	gpd/ac	0
Subtotal	258.29	1,265	--	--	719
				UAFW[d]	43
				Total Demand	***762***

NOTES: GPD/AC = GALLONS PER DAY PER ACRES, GPD/DU = GALLONS PER DAY PER DWELLING UNIT, AFY = ACRE-FEET PER YEAR.

[A] BASED ON A HDR WATER USE FACTOR OF 5,200 GPD/ACRE AND AN AVERAGE DENSITY OF 25 DU/ACRE.

[B] BASED ON A LDR WATER USE FACTOR OF 2,240 GPD/ACRE AND AN AVERAGE DENSITY OF 4.3 DU/ACRE.

[C] BECAUSE THE OPEN SPACE WILL NOT BE IRRIGATED, A WATER USE FACTOR OF 0 GPD/ACRE US ASSUMED.

[D] BASED ON 6 PERCENT OF TOTAL WATER DEMANDS.

SOURCE: WATER SUPPLY ASSESSMENT FOR OAKWOOD LANDING (WEST YOST ASSOCIATES, 2016).

The proposed Project does not intend to use recycled water at this time. The City currently uses undisinfected secondary effluent to irrigate fodder crops in the land adjacent to the City's wastewater treatment plant. However, there is no infrastructure in place to deliver tertiary treated recycled water to retail customers. Although the City is preparing a Recycled Water Master Plan and intends to use recycled water to offset potable water demands for outdoor uses in the future, recycled water infrastructure is not planned to be constructed in time to serve the buildout of the proposed Project. Therefore, recycled water supplies are not included in the Water Supply Assessment.

However, if recycled water supplies become available to serve the proposed Project, approximately 16 acres of parks within the Project site could be irrigated with recycled water. In this case, the recycled water demand would be approximately 69 AFY (65 AFY plus 6 percent UAFW) and the potable water demand would be reduced to approximately 693 AFY.

PROJECTED WATER SUPPLY FOR THE PROPOSED PROJECT

Water demands for the proposed Project will be served using the City's existing and future portfolio of water supplies. The inclusion of existing and planned future supplies is specifically allowed by the Water Code:

> *Water Code section 10631(b): Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a).*

The applicants for the proposed Project will provide their proportionate share of required funding to the City for the acquisition and delivery of treated potable water supplies to the proposed Project site.

City of Manteca Water Demand

The following topics are covered in this section:

- Existing and projected water demand; and
- Dry year water demand.

EXISTING AND PROJECTED WATER DEMAND

The City's 2015 UWMP describes the projected City water demand through 2040. The City's demand projections include water use reductions assuming the City is able to meet its 2020 per capita water use target. The water use projections developed in the City's 2015 UWMP were based on the following assumptions:

1. Historical residential water use makes up about 85 percent of total potable water demand; therefore, water demands are projected based on population growth rate of 2.3 percent per year and projected population. It is assumed that the growth includes areas annexed by the City as well as City infill development.
2. The growth rate is applied to 2013 demand, as 2013 was the last year of normal water use before State water conservation regulations went into effect in 2014 and 2015.
3. Projected irrigation demand was reduced based on projected recycled water supply for landscape irrigation. Recycled water would replace potable and raw water.
4. Potable water losses were calculated using a historic loss estimate of 12 percent of potable demands, and anticipating that the implementation of AMI by 2018 will reduce losses to 8 percent by 2020, 7 percent by 2025, 6 percent by 2030, and 5 percent thereafter.

5. To meet the SBX7-7 Target Water Use of 179 GPCD for the projected population, the projected total potable water use (including landscape irrigation and unaccounted for water losses) was further reduced by approximately 1 percent for the years 2020 through 2040.

The City's existing and projected potable and raw water demand, as documented in the City's 2015 UWMP is shown in Table 3.14-6. The projected water demands shown in Table 3.14-6 were used for preparation of the Water Supply Assessment.

TABLE 3.14-6: CITY OF MANTECA EXISTING AND PROJECTED TOTAL WATER DEMAND IN NORMAL YEARS, AFY

	2015	*2020*	*2025*	*2030*	*2035*	*2040*
Potable and Raw Water Demand	12,844	19,350	21,480	23,880	25,960	27,530
Recycled Water Demand[(a)]	1,463	900	480	290	740	2,240
Total Water Demand	*14,307*	*20,250*	*21,960*	*24,170*	*26,700*	*29,770*

NOTES: AFY = ACRE-FEET PER YEAR.

[(A)] CURRENT RECYCLED WATER USE IS LIMITED TO UNDISINFECTED SECONDARY EFFLUENT USED TO IRRIGATE FODDER CROPS ON LANDS ADJACENT TO THE CITY'S WASTEWATER TREATMENT PLANT.

SOURCE: CITY OF MANTECA 2015 UWMP, TABLE 4-3, TOTAL WATER DEMANDS.

The City's projected water demand at buildout (based on existing water demand, on-going development projects with approved water supply, the projected water demand of the Project, and undefined future developments) is summarized in Table 3.14-7. The City's detailed demand projections for future developments with approved water supply, as of September 2016, have been updated by West Yost to be based on the HDR and LDR water use factors that were adjusted for SBX7-7 (see Table 3.14-4). These revised demand projections for the City's future developments are included in Appendix A of the Water Supply Assessment (Appendix F of this Draft EIR).

TABLE 3.14-7: CITY OF MANTECA PROJECTED FUTURE WATER DEMAND AT 2040, AFY

	POTABLE AND RAW WATER	*RECYCLED WATER*	*TOTAL*
Current (2015) Water Demand[(a)]	16,249	1,463	17,712
Future Developments with Approved Water Supply[(b)]	6,543	--	6,543
Current Applications within Planning Area[(c)]	2,964	--	2,964
Subtotal (without Project)	**25,756**	**1,463**	**27,219**
Proposed Project[(d)]	762	—	762
Subtotal (with Project)	**26,518**	**1,463**	**27,981**
Undefined Future Developments[(e)]	1,012	777	1,789
Total Water Demand	**27,530[(f)]**	**2,240[(g)]**	**29,770**

NOTES: AFY = ACRE-FEET PER YEAR.

[(A)] THE CURRENT POTABLE AND RAW WATER DEMAND IS BASED ON THE CITY'S 2015 SERVICE AREA POPULATION (72,169 PEOPLE) AND THE CITY'S 2015 PER CAPITA WATER USE TARGET (201 GPCD). RECYCLED WATER DEMAND IS FROM THE CITY'S 2015 UWMP, TABLE 4-3.

[B] *Includes projects with existing entitlements and projects with adopted WSA, as of September2016 (see Appendix A of Appendix F).*

[C] *Includes current applications within the City's planning area (no adopted WSA or entitlement), as of September 2016 (see Appendix A of Appendix F). Equals Dolcinea (24 AFY), Hat Ranch (477 AFY), Oakwood Trails (403 AFY), Marini Complex (4 AFY), Copper Cove/Yosemite (888 AFY), Northwest Airport Way (281 AFY), and Griffin Park (887 AFY). An estimated water demand of 887 AFY, instead of 949 AFY, was used for Griffin Park to reflect the demand reported in the Griffin Park draft WSA, dated October 2016.*

[D] *Based on Proposed Project's net total demand from Table 2-4 of 2015 UWMP.*

[E] *Balance between Subtotal (with Project) and Total Water Demand.*

[F] *Based on the City's 2040 total potable and raw water demand (From Table 4-3 in the City's 2015 UWMP).*

Source: Water Supply Assessment for Oakwood Landing (West Yost Associates, 2016).

Dry Year Water Demand

The City currently has a water conservation program in place, as described in Chapter 8 of the City's 2015 UWMP. The City's Water Shortage Contingency Plan includes a five-stage plan describing water conservation measures to reduce water demand by up to 50 percent in the event of a water supply shortage or emergency. The water shortage stages, and their respective anticipated reduction in potable water demand, are shown in Table 3.14-8.

Table 3.14-8: Water Shortage Contingency Plan Projected Demand Reduction

Stage	*Percent Supply Reduction*
I	Up to 10 percent
II	11 – 20 percent
III	21 – 30 percent
IV	31 – 40 percent
V	41 – 50 percent

Source: City of Manteca 2015 UWMP, Table 8-1, Stages of WSCP.

When comparing potable water supply to demand in the City's 2015 UWMP and in the Water Supply Assessment prepared for the proposed Project, the dry year water demands are assumed to not include implementation of the City's Water Shortage Contingency Plan. This is a conservative assumption as additional water conservation will likely occur as a result of the City's implementation of its Water Shortage Contingency Plan in response to dry years or other water supply shortages. Table 3.14-9 presents the projected future dry year potable water demand.

Table 3.14-9: Projected Future Dry Year Potable and Raw Water Demand, AFY

Hydrologic Condition	*Demand Reduction[A]*	*2020*	*2025*	*2030*	*2035*	*2040*
Single Dry Year, AFY	0%	19,350	21,480	23,880	25,960	27,530
Multiple Dry Years, AFY[b]	0%	19,350	21,480	23,880	25,960	27,530

Notes: AFY = acre-feet per year.

[A] *Conservatively assumes no demand reduction in dry years.*

[B] *Represents demands for each year of the 3-year multiple dry year period.*

Source: Water Supply Assessment for Oakwood Landing (West Yost Associates, 2016).

City of Manteca Water Demand

Key topics addressed in this section include:

- City's surface water supply; and
- City's groundwater supply.

The City's potable water supply availability and reliability is discussed after this section.

SURFACE WATER SUPPLY

The principal component of future water supply for the City is deliveries from the SSJID's South County Water Supply Program (SCWSP). The City, along with four other cities/retail water suppliers (Escalon, Lathrop, Tracy, and Ripon), signed water supply agreements with SSJID to supply treated potable water to the participating cities.

The Nick C. DeGroot Water Treatment Plant (WTP) is commissioned for the SCWSP and is currently operated by SSJID. The WTP has a total Phase 1 capacity of 40,350 AFY and the Phase 2 capacity is anticipated to be 63,600 AFY. However, Phase 2 has not yet been implemented and there are no immediate plans to bring Phase 2 online. Currently, the City is allotted 11,500 AFY under Phase 1 and a total of 18,500 AFY under Phase 2. The term of the City's water supply agreement with SSJID is through December 2029. After this time, ownership of the WTP reverts to the cities unless the agreement is renewed. Historically, the City has not utilized its full allocation of surface water due to system constraints and, more recently, State and SSJID supply limits in response to the drought. The City anticipates utilizing the full amount of the SCWSP by 2025.

GROUNDWATER SUPPLY

The local groundwater basin and City groundwater use are described in the City's 2015 UWMP. A summary of the groundwater basin and historical and projected groundwater pumping are provided below.

Basin Description. The City's wells are located in the Eastern San Joaquin County Groundwater Basin (ESJCGB), which is a subbasin of the San Joaquin Valley Groundwater Basin. The groundwater aquifers underlying the City have been identified to include four geologic formations. In increasing depth from the surface, the identified aquifers are Victor Formation, Laguna Formation, Mehrten Formation, and Valley Springs Formation. Due to the alluvial generation of these aquifers, there is significant variation in grain size, with lenses and strata of high yield gravel, permeable sandy material, and lower permeability clays. In general, the strata slopes from the hills east of the City downward to the west, providing good recharge from hill runoff as well as from the Stanislaus River. The City's wells primarily withdraw water from the Laguna and Victor Formations.

The basin is not adjudicated; however, a basin management plan has been created. The Eastern San Joaquin Groundwater Basin Groundwater Management Plan (ESJGB-GMP) (NSJCGB, 2004) was prepared in September 2004. According to Department of Water Resources (DWR) Bulletin 118 (DWR, 2006), the ESJCGB is in a critical condition of overdraft. Groundwater levels have been

historically declining at an average rate of 1.7 feet per year. Groundwater overdraft in the overall basin and the City's groundwater withdrawal rate is of vital concern to the City as this poses a long-term risk to the reliability of the groundwater supply.

Groundwater Production. According to the City's 2015 UWMP, the sustainable yield of the groundwater basin was estimated in a 1985 study[3] to be approximately 1 acre-foot per acre per year. Although groundwater pumping in some years has exceeded that rate, as part of the SCWSP, the City intends to limit groundwater pumping to that rate or less. Projected groundwater availability is therefore based on an assumption that 1 AFY of groundwater is available per acre of City service area.

The total groundwater pumping that occurs within the City boundaries includes City-owned municipal wells and City-owned park irrigation wells, in addition to irrigation and domestic wells owned and operated by others. The following section provides a summary of the estimated groundwater pumping that occurs within the current City limits and Planning Area, however, it is important to note that groundwater pumping data collection is on-going and there are potentially many groundwater pumping wells that are unmetered and unidentified.

City-Produced Groundwater. The City owns and operates 15 potable water wells and 31 irrigation wells. The City's annual potable groundwater production has steadily increased historically, reaching a peak of 14,900 AF in 2004. Commissioning of the surface water treatment plant in 2005 decreased groundwater use considerably and currently supplies an average of 52 percent of the City's annual potable water supply. Since 2005, the City has constructed dedicated irrigation wells at many parks in an effort to reduce potable demand, which requires wellhead treatment at many wells for arsenic and other constituents to meet drinking water standards. In 2000, the City pumped about 1.2 AFY/acre, but this has since decreased to about 0.7 AFY/acre in 2010 and to about 0.5 AFY/acre in 2015.

When the City annexes new areas, there is a corresponding increase in total groundwater safe yield. However, the 1 AFY/acre does not provide sufficient water supply for most projects.

Groundwater Pumping by Others. Because there are numerous wells not owned by the City that are drawing from the Basin, the amount of groundwater available to the City within the groundwater basin safe yield could be affected. Wells currently in operation not owned by the City include private domestic wells, agricultural wells, wells for school irrigation owned by the Manteca Unified School District (MUSD), and irrigation wells owned by SSJID, among others. Well completion reports obtained from DWR suggest that approximately 1,000 water wells have been constructed within the General Plan area since record keeping began in the 1960s; however, many may not have been registered as abandoned. It is anticipated that most domestic wells are no longer in use, though further investigation would be needed to verify this assumption.

[3] This study is possibly the study that is referenced in Bulletin 118 (1/20/2006 version), "Eastern San Joaquin County Groundwater Study. Final Report." San Joaquin County Flood Control and Water Conservation District, prepared by Brown & Caldwell Consulting Engineers, 1985.

MUSD and others own and operate wells within the City and its Planning Area. It is assumed that pumping by MUSD and other known pumpers within the City and its Planning Area should be included in the groundwater safe yield accounting for purposes of this evaluation. Groundwater pumping by others may also be included in future updates of this initial estimate.

Metered pumping records for MUSD and SSJID have not yet been provided to the City. The groundwater pumping from other ESJCGB entities were estimated as follows:

- The MUSD is assumed to irrigate 25 percent of its parcels at 4 AFY/acre. Given that the MUSD has approximately 500 total acres, the total annual water use should be limited to approximately 500 AFY.

- According to the SSJID 2015 UWMP, SSJID considers groundwater as an emergency source and does not normally pump from their wells. However, SSJID leases some of their wells to area farmers. The SSJID 2015 Agricultural Water Management Plan (AWMP) estimates that approximately 2,600 to 6,300 AFY are pumped from their 28 production wells. Many of SSJID's wells lie within the City and its Planning Area. It is assumed that 50 percent of the annual SSJID groundwater pumping occurs within the City's Planning Area and is exported to agricultural land outside the City. The AWMP noted that total well pumping capacity is as high as 37,800 AFY, so it is possible that dry-year pumping (when surface water supplies are reduced) far exceed the average annual pumping estimate included in the AWMP. The water use for City's agricultural irrigation during normal and dry years is assumed to be 2,230 AFY.

- Other known industrial groundwater pumpers include Eckerts Cold Storage. The City treats over 130 AF of wastewater produced by Eckerts Cold Storage each year. Based upon this average, groundwater pumping is estimated at over 150 AFY. Other industrial and commercial users likely exist.

Historical Groundwater Pumping. Historically, the City extracted groundwater at a rate as high as 1.6 AFY/acre, based on the developed City area. As discussed previously, the SCWSP allowed the City to reduce local groundwater extraction to less than the basin safe yield of 1.0 AFY/acre.

Since 2006, after the commissioning of the SCWSP, the total groundwater pumping for the City of Manteca has ranged from 8,062 AFY to 10,374 AFY, averaging about 8,700 AFY. Pumping amounts have generally been consistent over the last 5 years, with a decrease in 2014 and 2015, likely attributable to statewide mandatory demand reduction regulations. With this exception, there were no limitations or challenges for obtaining groundwater during the last 5 years, and the available groundwater quantity was sufficient. Groundwater pumping by City wells from 2011 to 2015 is summarized in Table 3.14-10.

TABLE 3.14-10: HISTORICAL GROUNDWATER PRODUCTION, AFY

	2011	*2012*	*2013*	*2014*	*2015*
Groundwater Supply	9,156	10,374	9,922	6,546	7,249

SOURCE: CITY OF MANTECA 2015 UWMP, TABLE 6-2, GROUNDWATER VOLUME PUMPED.

Potable Water Supply Availability and Reliability

A description of the City's surface water and groundwater supply reliability is presented in the City's 2015 UWMP and is summarized below.

SURFACE WATER RELIABILITY

SSJID has existing agreements to provide surface water to agricultural interests, federal and state agencies, and cities in the south San Joaquin County area. Some of these agreements are long-term, while others are as short as one week for agricultural deliveries.

Surface water reliability is in part reliant on storage and releases from upstream dams along the Stanislaus River with respect to the Nick C. DeGroot WTP intake location. While SSJID has surface water rights to approximately 600,000 AFY jointly held with the Oakdale Irrigation District (OID), the full allocation to SSJID and OID are subject to runoff from the Stanislaus River and other constraints per the 1988 Stipulation and Agreement with the U.S. Bureau of Reclamation that constructed and operates New Melones Reservoir on the Stanislaus River.

According to the 1988 Agreement, SSJID is entitled to 300,000 AFY during normal water years, however drought conditions and seasonal variations have the potential to reduce the allocation to SSJID and the contracted cities it delivers water to, including the City of Manteca. The New Melones Reservoir inflow has a direct effect on surface water availability to SSJID. The following equation governs water supply availability to SSJID when inflows are less than 600,000 AF:

New Melones Inflow + [(600,000 - New Melones Inflow) / 3]

Currently, SSJID is expected to provide total supplies (including irrigation and potable) ranging from 225,000 AFY to 300,000 AFY, though the lowest supply on record was 225,000 AF in both 2014 and 2015 (SSJID 2016). In the event that shortages do occur, SSJID and OID share the deficiencies.

As mentioned previously, the City is allotted 11,500 AFY from SSJID under Phase 1 and a total of 18,500 AFY under Phase 2. The City anticipates Phase 2 of the SCWSP to be implemented by 2025, providing an additional 7,000 AFY in surface water supply to the City.

Reliability of SCWSP Deliveries. Under single-year and multiple-year dry period scenarios, deliveries to the City by SSJID could be reduced. The availability and reliability of the City's SCWSP surface water deliveries during dry years according to the City's 2015 UWMP and SSJID's 2015 UWMP are described below:

- For Single Dry Year reliability, the City has based its projected SSJID allocations on the single driest hydrologic year (Year 1977). With this assumption, the City anticipates receiving 75 percent of its normal year water supply during a single dry year.
- For Multiple Dry Year 1 reliability, the City has based its projected SSJID allocations on the first year of a multiple dry hydrologic year (Year 1990). With this assumption, the City

anticipates receiving 87 percent of its normal year water supply during the first year of a multiple dry year.

- For Multiple Dry Year 2 reliability, the City has based its projected SSJID allocations on the second year of a multiple dry hydrologic year (Year 1991). With this assumption, the City anticipates receiving 89 percent of its normal year water supply during the second year of a multiple dry year.
- For Multiple Dry Year 3 reliability, the City has based its projected SSJID allocations on the third year of a multiple dry hydrologic year (Year 1992). With this assumption, the City anticipates receiving 84 percent of its normal year water supply during the third year of a multiple dry year.

The projected surface water deliveries available to the City during normal, single-dry, and multiple-dry years are presented in Table 3.14-11.

TABLE 3.14-11: SCWSP SURFACE WATER DELIVERIES TO THE CITY OF MANTECA DURING HYDROLOGIC NORMAL, SINGLE-DRY, AND MULTIPLE-DRY YEARS, AFY

	PERCENT OF NORMAL SUPPLY	*2020*	*2025*	*2030*	*2035*	*2040*
Normal Year[a]	0%	11,500	18,500	18,500	18,500	18,500
Single Dry Year	75%	8,625	13,875	13,875	13,875	13,875
Multiple Dry Year 1	87%	10,005	16,095	16,095	16,095	16,095
Multiple Dry Year 2	89%	10,235	16,465	16,465	16,465	16,465
Multiple Dry Year 3	84%	9,660	15,540	15,540	15,540	15,540

SOURCE: CITY OF MANTECA 2015 UWMP, TABLE 6-11, PROJECTED WATER SUPPLIES.

GROUNDWATER RELIABILITY

There are many factors that can affect groundwater supply reliability, including current storage conditions, water quality, seasonal groundwater level variations, and climate change. Reduced water use by the City, combined with seasonal variations such as intense wet seasons, can result in increased groundwater table elevation. Additionally, all wells are located in the western portion of the SSJID service area and draw from the Eastern San Joaquin Subbasin, the same basin that the cities of Manteca, Lathrop, Stockton, and other groundwater users draw from. For the purposes of this evaluation, only groundwater pumping estimated to be occurring within the City General Planning area is included.

While seasonal fluctuations do have a noticeable effect on groundwater elevation, the overall trend showed a decline over time until the City began to use imported surface water in 2005. Historical trends from California Statewide Groundwater Elevation Monitoring (CASGEM) indicate that the basin has experienced groundwater overdraft conditions. The introduction of surface water supply has helped groundwater elevation trends recover within the City by reducing pumping in the area.

Groundwater supply projections include approved, proposed, and entitled developments outside of the City boundaries, but within the Planning Area, and estimated groundwater pumping by others within the Planning Area. The projected groundwater supply reliability does not account for groundwater pumping outside the City Planning Area, nor undocumented, privately-owned domestic or irrigation wells. Groundwater use may increase as population increases, and groundwater use by others (including MUSD and agricultural users) may also increase in single-dry years and multiple-dry years (when surface water cutbacks occur). Constant groundwater demands from the MUSD and agricultural users have been assumed for all hydrologic scenarios.

The projected groundwater supplies during normal, single-dry, and multiple-dry years available to the City and the proposed Project are summarized in Table 3.14-12. The total groundwater supplies are considered 100 percent reliable during hydrologic normal years, single-dry years, and multiple-dry years.

TABLE 3.14-12: PROJECTED GROUNDWATER PRODUCTION DURING HYDROLOGIC NORMAL, SINGLE-DRY, AND MULTIPLE-DRY YEARS, AFY

	2020	*2025*	*2030*	*2035*	*2040*
City Safe Yield	13,570	13,570	13,570	13,570	13,570
MUSD Estimated Pumping	- 500	- 500	- 500	- 500	- 500
Estimated Agricultural Irrigation	- 2,860	- 2,860	- 2,860	- 2,860	- 2,860
Eckerts Cold Storage Pumping	- 150	- 150	- 150	- 150	- 150
Total Supply	**10,060**	**10,060**	**10,060**	**10,060**	**10,060**

NOTES: AFY = ACRE-FEET PER YEAR.

SOURCE: CITY OF MANTECA 2015 UWMP, TABLE 6-10, PROJECTED GROUNDWATER SUPPLIES.

Determination of Water Supply Sufficiency

Water Code section 10910 states:

> *10910(c)(4) If the city or county is required to comply with this part pursuant to subdivision (b), the water supply assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.*

Pursuant to Water Code section 10910(c)(4), and based on the technical analyses described in the *Water Supply Assessment for Oakwood Landing*, the total projected water supplies determined to be available for the proposed Project during normal, single-dry, and multiple-dry water years during a 20-year projection will meet the projected water demand associated with the proposed Project, in addition to existing and planned future uses.

A comparison of the City's projected potable and raw water supplies and demands is shown in Table 3.14-13 for normal, single-dry, and multiple-dry years. This comparison can also be seen on Figure 3.14-1, Figure 3.14-2, Figure 3.14-3, Figure 3.14-4, and Figure 3.14-5.

TABLE 3.14-13: SUMMARY OF POTABLE AND RAW WATER DEMAND VS. SUPPLY DURING HYDROLOGIC NORMAL, SINGLE DRY, AND MULTIPLE DRY YEARS

HYDROLOGIC CONDITION		SUPPLY AND DEMAND COMPARISON, AFY				
		2020	2025	2030	2035	2040
Normal Year						
Available Water Supply[a]		21,560	28,560	28,560	28,560	28,560
Total Water Demand (with Proposed Project) [b]		19,350	21,480	23,880	25,960	27,530
Potential Surplus (Deficit)		**2,210**	**7,080**	**4,680**	**2,600**	**1,030**
Supply Shortfall, Percent of Demand		--	--	--	--	--
Single Dry Year						
Available Water Supply[a]		18,685	23,935	23,935	23,935	23,935
Total Water Demand (with Proposed Project) [b]		19,350	21,480	23,880	25,960	27,530
Potential Surplus (Deficit)		**(665)**	**2,455**	**55**	**(2,025)**	**(3,595)**
Supply Shortfall, Percent of Demand		3%	--	--	8%	13%
Multiple Dry Year						
Multiple-Dry Year 1	Available Water Supply[a]	20,065	26,155	26,155	26,155	26,155
	Total Water Demand (with Proposed Project) [b]	19,350	21,480	23,880	25,960	27,530
	Potential Surplus (Deficit)	**715**	**4,675**	**2,275**	**195**	**(1,375)**
	Supply Shortfall, Percent of Demand	--	--	--	--	5%
Multiple-Dry Year 2	Available Water Supply[a]	20,295	26,525	26,525	26,525	26,525
	Total Water Demand (with Proposed Project) [b]	19,350	21,480	23,880	25,960	27,530
	Potential Surplus (Deficit)	**945**	**5,045**	**2,645**	**565**	**(1,005)**
	Supply Shortfall, Percent of Demand	--	--	--	--	4%
Multiple-Dry Year 3	Available Water Supply[a]	19,720	25,600	25,600	25,600	25,600
	Total Water Demand (with Proposed Project) [b]	19,350	21,480	23,880	25,960	27,530
	Potential Surplus (Deficit)	**370**	**4,120**	**1,720**	**(360)**	**(1,930)**
	Supply Shortfall, Percent of Demand	--	--	--	1%	7%

NOTES: AFY = ACRE-FEET PER YEAR.

(A) EQUALS THE SUM OF THE CITY'S PROJECTED SURFACE WATER SUPPLIES (SEE TABLE 6-2 OF THIS WSA) AND THE CITY'S PROJECTED GROUNDWATER SUPPLIES (SEE TABLE 6-3 OF THIS WSA).

(B) EQUALS THE CITY'S TOTAL PROJECTED POTABLE AND RAW WATER DEMAND (FROM TABLE 4-3 IN THE CITY'S 2015 UWMP).

SOURCE: WATER SUPPLY ASSESSMENT FOR OAKWOOD LANDING (WEST YOST ASSOCIATES, 2016).

As shown in Table 3.14-13, demand within the City's service area is not expected to exceed the City's supplies in any normal year between 2020 and 2040.

For purposes of the *Water Supply Assessment for Oakwood Landing*, the City has chosen to assume no demand reductions during dry years. With this assumption, potential deficits in water supply occur after 2035 during single-dry years and occur in 2040 during multiple-dry years. During single-dry years, the City's total annual water demand is estimated to exceed total annual supply by 2,025 AF and 3,595 AF in 2035 and 2040, respectively. This results in a total water supply shortfall of 8 percent in 2035 and 13 percent in 2040. During all three multiple-dry years, the City

can anticipate water supply shortages by 2040. The greatest water supply shortfall is 7 percent (1,930 AF), which occurs during Multiple Dry Year 3. To mitigate these potential deficits, the City may need to implement minimal short term demand reductions (water conservation) and/or employ additional water supply options.

The scale of shortages anticipated by 2035 in single-dry years and 2040 in multiple-dry years can be mitigated through the implementation of the Water Shortage Contingency Plan described in Chapter 8 of the City's 2015 UWMP and additional conservation measures discussed in Chapter 9 of the City's 2015 UWMP. To prevent water supply deficits during single-dry years, the City may need to reduce demands by 12 percent, which is well within the 20 percent demand reduction defined in Stage II of the City's Water Shortage Contingency Plan. During multiple-dry years, the City may need to reduce demands by as much as 6 percent, which is within the 10 percent demand reduction defined in Stage I of the City's Water Shortage Contingency Plan.

To ensure adequate supply to accommodate the City's projected growth and demand, additional water sources for the City by 2035 have also been identified. As described in Chapter 6 of the City's 2015 UWMP, three water supply options were identified to mitigate future water supply shortfalls:

1. Recycled water: The City can develop their recycled water infrastructure to offset the groundwater used for park irrigation with reclaimed water. The quantity of groundwater replaced by recycled water can then be used for potable municipal uses, while staying within the sustainable yield constraints of 1 AFY/Ac.

2. Additional untreated surface water: As the City annexes areas, the raw water that irrigated the annexed lands may be available either to be treated for potable municipal uses or used to offset the potable water used for irrigation.

3. Additional treated surface water: The City may be able to negotiate and obtain additional potable water supply from the SCWSP.

Planned Infrastructure Updates

Water supply will be provided by the City of Manteca, which includes surface and ground water supplies. Water distribution will be by an underground distribution system installed as per the City of Manteca standards and specifications. As shown in Figures 2.0-11in Section 2.0 of this Draft EIR, Project site development would include the development of an on-site non-potable water distribution system that would eventually provide irrigation water to planned parks, open space, and landscaped areas. All landscape irrigation is to be installed with non-potable components.

Connection from all irrigation systems to the non-potable water service will be provided in the proposed streets. This connection is to be provided per the requirements of the City Water Division with a valve whether the irrigation is provided by a well or not. In the future, when the non-potable system is charged by the City, the irrigation will be provided by the non-potable water system with the irrigation well remaining as a back-up only. Irrigation shall be designed to maximize efficiency and meet the requirements of the City Parks Maintenance Division.

REGULATORY SETTING

Safe Drinking Water Act

The federal Safe Drinking Water Act as passed in 1947 and amended in 1986 and 1996. It is the Country's primary law regulating drinking water quality and in implemented by the United States Environmental Protection Agency (US EPA). The Safe Drinking Water Act authorizes the US EPA to set national health-based standards for drinking water and requires actions to protect drinking water and its sources. Additionally, it provides for treatment, monitoring, sampling, analytical methods, reporting, and public information requirements. Implementation of the Act, in California, is under the jurisdiction of the California Department of Public Health (CDPH), Division of Drinking Water and Environmental Management. Drinking Water regulations are set forth in the California Code of Regulations (CCR), Titles 7 and 22.

Water Conservation Projects Act

California's requirements for water conservation are codified in the Water Conservation Projects Act of 1985 (Water Code Sections 11950 – 11954).

Consistent with California Water Code Sections 11950 – 11954, the City has implemented various water conservation efforts, as well as Water Shortage Contingency Plan that identifies actions that can be taken to respond to catastrophic interruption of water supply.

California Water Code

Water Code section 10910 states:

> *10910(c)(2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f) and (g).*
>
> *10910(d)(1) The assessment required by this section shall include an identification of any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and a description of the quantities of water received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts.*
>
> *10910(d)(2) An identification of existing water supply entitlements, water rights, or water service contracts held by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall be demonstrated by providing information related to all of the following:*

(A) Written contracts or other proof of entitlement to an identified water supply.

(B) Copies of a capital outlay program for financing the delivery of a water supply that has been adopted by the public water system.

(C) Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply.

(D) Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.

10910(e) If no water has been received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts, the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall also include in its water supply assessment pursuant to subdivision (c), an identification of the other public water systems or water service contract-holders that receive a water supply or have existing water supply entitlements, water rights, or water service contracts, to the same source of water as the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has identified as a source of water supply within its water supply assessments.

Additionally, Water Code section 10910 states:

10910(f) If a water supply for a proposed project includes groundwater, the following additional information shall be included in the water supply assessment.

10910(f)(1) A review of any information contained in the urban water management plan relevant to the identified water supply for the proposed project.

10910(f)(2) A description of any groundwater basin or basins from which the proposed project will be supplied. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current bulletin of the department that characterizes the condition of the groundwater basin, and a detailed

description by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), of the efforts being undertaken in the basin or basins to eliminate the long term overdraft condition.

10910(f)(3) A detailed description and analysis of the amount and location of groundwater pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), for the past five years from any groundwater basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historical use records.

A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), from any basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historical use records.

10910(f)(4) An analysis of the sufficiency of the groundwater from the basin or basins from which the proposed project will be supplied to meet the projected water demand associated with the proposed project.

A water assessment shall not be required to include the information required by this paragraph if the public water system determines, as part of the review required by paragraph (1), that the sufficiency of groundwater necessary to meet the initial and projected water demand associated with the project was addressed in the description and analysis required by paragraph (4) of subdivision (b) of Section 10631.

Senate Bill (SB) 610

Senate Bill (SB) 610 was adopted in 2001 and reflects the growing awareness of the need to incorporate water supply and demand analysis at the earliest possible stage in the land use planning process. SB 610 amended the statutes of the Urban Water Management Planning Act, as well as the California Water Code Section 10910 et seq. The foundation document for compliance with SB 610 is the Urban Water Management Plan (UWMP), which provides an important source of information for cities and counties as they update their general plans. Likewise, planning documents such as general plans and specific plans form the basis for the demand information contained in an UWMP, as well as a Water Supply Assessment (WSA) required under SB 610.

Water Code Section 10910 (c)(4) states "If the city or county is required to comply with this part pursuant to subdivision (b), the water assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses."

Water supply planning under SB 610 requires reviewing and identifying adequate available water supplies necessary to meet the demand generated by a project, as well as the cumulative demand for the general region over the next 20 years, under a broad range of water conditions. This information is typically found in the current UWMP for the project area. SB 610 requires the identification of the public water supplier for a project.

In addition, SB 610 requires the preparation of a WSA if a project meets the definition of a "Project" under Water Code Section 10912 (a). The code defines a "Project" as meeting any of the following criteria:

- A proposed residential development of more than 500 dwelling units;
- A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space;
- A commercial building employing more than 1,000 persons or having more than 250,000 square feet of floor space;
- A hotel or motel with more than 500 rooms;
- A proposed industrial, manufacturing, or processing plant, or industrial park, planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area;
- A mixed-use project that includes one or more of these elements; or
- A project creating the equivalent demand of 500 residential units.

Alternately, if a public water system has less than 5,000 service connections, the definition of a "Project" includes any proposed residential, business, commercial, hotel or motel, or industrial development that would account for an increase of 10 percent or more in the number of service connections for the public water system. The proposed residential development of more than 500 dwelling units as part of a proposed residential uses, therefore, qualifies as a "Project" under Section 10912 (a) of the Water Code. Thus, the City has prepared a Water Supply Assessment (WSA) as required by these criteria under SB 610. The WSA is included in Appendix F of this EIR.

City of Manteca General Plan

GOALS: GENERAL SERVICES

- PF-6. Public facilities and services agencies will cooperate on a regional basis.
- PF-7. Maintain an adequate level of service in the City's water system to meet the needs of existing and projected development.
- PF-8. Maintain an adequate level of service in the City's sewage collection and disposal system to meet the needs of existing and projected development.
- PF-9. Maintain an adequate level of service in the City's drainage system to accommodate runoff from existing and projected development and to prevent property damage due to flooding.

POLICIES: GENERAL SERVICES

- PF-P-1. Facilitate development in the in-fill areas by extending infrastructure.
- PF-P-2. Encourage comprehensive development rather than incremental, single project development.
- PF-P-3. Make use of the public right-of-way as a tool for facilitating quality design and development.
- PF-I-1. The City shall periodically review its fee schedules for water and sewer connections and for city facilities and major equipment and revise them as necessary.
- PF-P-4. Secure sufficient sources of water to meet the needs of the existing community and planned residential and commercial growth.
- PF-P-5. City will continue to rely principally on groundwater resources for its municipal water in the near term, will participate in the regional improvements to deliver surface water to augment the City's groundwater supply.
- PF-P-6. The City shall develop new water sources as necessary to serve new development.
- PF-P-7. The City shall develop new water storage facilities and major distribution lines as necessary to serve new development.
- PF-P-8. The City will provide water for future development to maintain a balance of jobs and housing.
- PF-P-9. City water services shall not be extended to unincorporated areas except in extraordinary circumstances. Existing commitments for City water service outside the City limits shall continue to be honored.
- PF-P-10. Development of private water wells within the City limits shall be allowed only where the City makes a finding that it cannot feasibly provide water service. Such systems shall only be allowed to be used until such time as City water service becomes available.
- PF-P-11. The City will develop and implement water conservation measures as necessary elements of the water system.
- PF-P-12. The City shall continue to assess a water development fee on all new commercial, industrial, and residential development sufficient to fund system wide capacity improvements. The water development fee schedule shall be periodically reviewed and revised as necessary.
- PF-P-13. Ensure that all new development provides for and funds a fair share of the costs for adequate water distribution, including line extensions, easements, and plant expansions.
- PF-P-14. The City shall continuously monitor water flows through the City’s water system to identify areas of potential water loss and cases of under billing for water service and shall make improvements in the systems as necessary.
- PF-P-15. The City shall monitor water quality regularly and take necessary measures to prevent contamination.
- PF-P-16. The City of Manteca shall include a groundwater analysis as a technical analysis of water system capacity in the update of the Public Facilities Implementation Plan (PFIP), and shall prepare an environmental analysis in the PFIP that addresses the quality and availability of groundwater.

- PF-P-17. The City of Manteca shall consider incremental increases in the demands on groundwater supply and water quality when reviewing development applications.
- PF-P-18. Ensure wastewater collection and treatment for all development in the City and the safe disposal of wastes.
- PF-P-19. The City will maintain capacity to process combined residential, commercial, and industrial flow.
- PF-P-20. The City shall develop new sewage treatment and trunk line capacity as necessary to serve new development.
- PF-P-21. City sewer services will not be extended to unincorporated areas, except in extraordinary circumstances. Existing commitments for sewer service outside the city limits shall continue to be honored.
- PF-P-22. Development of individual septic systems may be allowed only where the City makes a finding that it cannot feasibly provide public sewer service, and such systems shall only be used until such time as City sewer service becomes available. Such systems shall meet the minimum standards of the San Joaquin County Health Department.
- PF-P-23. The City shall establish and maintain a growth management plan to ensure the development of a balanced mix of residential, commercial, industrial, and public land uses.
- PF-P-24. Ensure that all new development provides for and funds a fair share of the costs for adequate sewer distribution, including line extensions, easements, and plant expansions.
- PF-P-25. The City will maintain the ability to handle peak discharge flow while meeting State Regional Water Quality Control Board Standards as established in the current NPDES Permit.
- PF-P-26. The City shall continue to complete gaps in the drainage system in areas of existing development.
- PF-P-27. The City shall require the dedication and improvement of drainage detention basins as a condition of development approval according to the standards of the Drainage Master Plan. The responsibility for the dedication and improvement of detention basins shall be based on the prorated share of storm water runoff resulting from each development.
- PF-P-28. Storm drainage systems within new development areas shall include open drainage corridors where feasible to supplement or replace an underground piped drainage system. The drainage systems would provide for short-term storm water detention, storm water conveyance for storm waters exceeding a 10-year event, storm water quality treatment, bike and pedestrian paths, and visual open space within neighborhoods. The width and length of the corridors would be determined by the storm water management requirements. The drainage systems would provide a pedestrian connection between parks and access to open space from residential neighborhoods. The neighborhoods would be designed with homes oriented to, rather than backing on the open space corridor.

IMPLEMENTATION: WATER SUPPLY AND DISTRIBUTION

- PF-I-2. The City shall update the Public Facilities Implementation Plan, regarding water supply and distribution, every five years. The update shall be reviewed annually for adequacy and consistency with the General Plan.
- PF-I-3. The City shall require, as a condition of project approval, dedication of land and easements, or payment of appropriate fees and exactions, to help offset municipal costs of expansion of water treatment facilities and delivery systems.
- PF-I-4. The City shall retain a water conservation ordinance requiring the installation of low-flush toilets, low-flow showerheads, and similar features in all new development.
- PF-I-5. The City shall institute a remote monitoring program for the City's water system and replace faulty meters in the system as necessary. The City will continue the practice of identifying and replacing faulty meters at service connections on an ongoing basis.
- PF-I-6. The City shall regularly monitor water quality in City wells and take remedial action as necessary.
- PF-I-7. The City will encourage the use of recycled water for landscape irrigation where feasible, within the parameters of State and County Health Codes and standards.
- PF-I-8. The City shall update the Public Facilities Implementation Plan regarding wastewater collection and treatment every five years. The update shall be reviewed annually for adequacy and consistency with the General Plan.
- PF-I-9. The City will require all sewage generators within its service area to connect to the City's system, except those areas where on-site treatment and disposal facilities are deemed appropriate.
- PF-I-10. The City will encourage and permit an industrial pretreatment program for business parks and other industrial uses in accordance with state and federal requirements.
- PF-I-11. The City will investigate methods of improving the quality of the effluent from the City plant and will investigate options for reuse of treated wastewater. The recycled wastewater will be used for irrigation of public recreation lands, restoration of wetland areas, and irrigation of landscaped areas.
- PF-I-12. The City will promote reduced wastewater system demand through efficient water use by:
  - requiring water conserving design and equipment in new construction,
  - encouraging retrofitting with water conserving devices,
  - designing wastewater systems to minimize inflow and infiltration to the extent economically feasible; and
  - maintaining a Citywide map of all sewer collection system components and monitoring the condition of the system on a regular basis.
- PF-I-13. The City shall update the Storm Drainage Master Plan and Public Facilities Implementation Plan, regarding water supply and distribution, every five years. The update shall be reviewed annually for adequacy and consistency with the General Plan.

GOAL: DAM FAILURE INUNDATION

- S-3. Prevent loss of lives, injury, and property damage due to flooding.
- S-4. Pursue flood control solutions that minimize environmental impacts.

POLICIES: FLOOD SAFETY

- S-P-7. Regulate all uses and development in areas subject to potential flooding through zoning and other land use regulations.
- S-P-8. Cooperate with other agencies in the pursuit of a regional approach to flood issues.
- S-P-9. Combine flood control, recreation, water quality, and open space functions where feasible.
- S-P-10. Ensure that any existing structures subject to the 200-year flood provide adequate protection from flood hazards.
- S-P-11. Ensure that the impacts of potential flooding are adequately analyzed when considering areas for future urban expansion.
- S-P-12. New residential development, including mobile homes, shall be constructed so that the lowest floor is at least one foot above the 200-year flood level.
- S-P-13. Non-residential development shall be anchored and flood-proofed in accord with Federal Emergency Management Agency (FEMA) standards to prevent damage or causing damage due to a 200-year flood or, alternatively, elevated to at least one foot above the 200-year flood level.
- S-P-14. When improvements to existing developments are made costing at least 50 percent of the current market value of the structure before improvements, the structure shall be brought into compliance with FEMA standards.
- S-P-15. Ensure the city is in compliance with the Central Valley Flood Protect Plan.

IMPLEMENTATION: FLOOD SAFETY

- S-I-4. The City shall continue to participate in the National Flood Insurance Program. To this end, the City shall ensure that local regulations are in full compliance with standards adopted by the Federal Emergency Management Agency (FEMA). The City shall adopt and implement local flood management development standards.
- S-I-5. Provide flood warning and forecasting information to City residents.
- S-I-6. Discourage large continuous paved areas unless provided with engineered drainage facilities.
- S-I-7. Where feasible, require the use of pervious paving materials, such as brick or stepping stones with sand joints.
- S-I-8. New development shall be required to maintain natural stream courses and adjacent habitat and combine flood control, recreation, water quality, and open space functions.
- S-I-9. Participate in the development of a collaborative local flood plan for San Joaquin County.

GOALS: WATER CONSERVATION

- RC-1. Minimize the consumption of water to reasonable levels consistent with a high level of amenities and quality of life for City residents and visitors.
- RC-2. Maximize the beneficial uses of water by recycling water for irrigation and other non-potable uses.

POLICIES: WATER CONSERVATION

- RC-P-1. The City shall continue to implement water conservation standards for all commercial and industrial development, and for all existing and new residential development.
- RC-P-2. The City shall explore potential uses of treated wastewater when such opportunities become available.
- RC-P-3. The City shall protect the quantity of Manteca's groundwater.
- RC-P-4. The City shall require water conservation in both City operations and private development to minimize the need for the development of new water sources.
- RC-P-5. Development of private water wells within the city limits shall be allowed only where the City makes a finding that municipal water service is not readily and feasibly available, and such private well systems shall only be allowed to be used until such time as City water service becomes available.

IMPLEMENTATION: WATER CONSERVATION

- RC-I-1. Continue to implement standards for water conserving landscape practices, including the use of drought tolerant plants, for both public and private projects.
- RC-I-2. Continue efforts to increase public participation in water conservation.
- RC-I-3. Require large commercial and industrial water users to submit a use and conservation plan as part of the project entitlement review and approval process, and develop a program to monitor compliance with and effectiveness of that plan.
- RC-I-4. Cooperate with other agencies and jurisdictions to expand water conservation programs, and to develop methods of water reuse.
- RC-I-5. Actively pursue the use of treated wastewater in irrigation and industrial applications, including development of appropriate infrastructure.

GOAL: SOIL AND EROSION CONTROL

- RC-6. Preserve and maintain Manteca's soils to avoid pollution of surface waters, decreased air quality, and loss of soil.

POLICY: SOIL AND EROSION CONTROL

- RC-P-10. Minimize soil erosion and loss of topsoil from land development activities, wind, and water flow.

IMPLEMENTATION: SOIL AND EROSION CONTROL

- RC-I-16. All new development shall comply with the Uniform Building Code (UBC) requirements for specific site development and construction standards for specific soil types.
- RC-I-17. All new development shall comply with the Uniform Building Code (UBC), Chapter 70, regulating grading activities including drainage and erosion control.
- RC-I-18. Require site-specific land management and development practices for proposed development projects, including appropriate mitigation measures for avoiding or reducing erosion.
- RC-I-19. The City shall work with the County and surrounding communities to develop an action plan and/or to create an agency to manage and protect local and regional groundwater resources.
- RC-I-20. The City shall not approve new industrial or commercial development that has a significant potential for adversely affecting water quality in the San Joaquin River or in the area's groundwater basin.
- RC-I-21. The City shall regularly monitor water quality in City wells for evidence of toxics, saltwater intrusion, and other contaminants.
- RC-I-22. Maintain a buffer area between waterways and urban development to protect water quality and riparian areas.
- RC-I-23. Utilize cost-effective urban runoff controls, including Best Management Practices (BMPs), to limit urban pollutants from entering the water courses.
- RC-I-24. Comply with the Regional Water Quality Control Board's regulations and standards to maintain and improve groundwater quality in Manteca.

GOAL: WATER QUALITY

- RC-7. To protect water quality in the San Joaquin River and in the area's groundwater basin.

POLICIES: WATER QUALITY

- RC-P-11. Minimize sedimentation and loss of topsoil from soil erosion.
- RC-P-12. Minimize pollution of waterways and other surface water bodies from urban runoff.
- RC-P-13. Protect the quality of Manteca's groundwater.
- RC-P-14. Encourage participation by the County and surrounding communities in a basin-wide groundwater management study.
- RC-P-15. Once sewer service has been extended to incorporated areas, new septic tanks shall not be permitted.

Utility Master Plans

The City of Manteca maintains a variety of Master Plan documents that guide the design, development, and maintenance of the utilities within the city limits. These include: *Urban Water*

Management Plan (2015), *Water Master Plan* (2005), *Storm Drain Master Plan* (2013) *Wastewater Collection System Master Plan* (2012), *Wastewater Quality Control Facility Master Plan Update* (2006), *Draft Sewer Rate Study* (2008).

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the proposed Project may have a significant impact on the environment associated with Utilities if it would:

1. Require or result in the construction of new water treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects; or
2. Have insufficient water supplies available to serve the Project from existing entitlements and resources, or if new or expanded entitlements are needed.

IMPACTS AND MITIGATION MEASURES

Impact 3.14-4: The proposed Project has the potential to require construction of new water treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. (Less than Significant)

The provision of public services and the construction of onsite infrastructure improvements will be required to accommodate the development of the proposed Project. Water distribution will be by an underground distribution system to be installed as per the City of Manteca standards and specifications.

The proposed Project would require extension of offsite water conveyance infrastructure to the Project site. All offsite water utility improvements will be in or adjacent to existing roadways along the perimeter of the Project site, thereby limiting any potential impact to areas that were not already disturbed. Construction of the potable water infrastructure would not have the potential to induce growth beyond what is proposed because the infrastructure is not oversized to accommodate additional projects or growth.

The proposed Project would require the construction of new onsite water conveyance infrastructure. All onsite water utility improvements will be within existing agricultural lands or roadways, the impacts of which are discussed in Section 3.2 Agricultural Resources. Construction of the onsite potable water infrastructure would not have the potential to induce growth beyond what is proposed because the infrastructure is not oversized to accommodate additional projects or growth.

The proposed Project would not require the construction of new water treatment facilities or expansion of existing water treatment facilities for water service. Implementation of the proposed Project would have a **less than significant** impact relative to this topic.

Impact 3.14-5: The proposed Project has the potential to have insufficient water supplies available to serve the Project from existing entitlements and resources. (Less than Significant)

PROJECT WATER DEMAND

It is anticipated that water supply for the Proposed Project would be local groundwater and treated surface water from SSJID's SCWSP.

The applicant for the proposed Project will provide their proportionate share of required funding to the City for the acquisition and delivery of treated potable water supplies to the proposed Project site through connection fees and other means. This arrangement will be outlined within the Development Agreement between the Project applicant and the City. The Development Agreement will be completed and approved as part of the City's formal land use actions.

The City has adequate water supplies to support existing demand in the City in addition to the proposed Project under average daily and maximum daily demand conditions. As shown in Table 3.14-7, water demand for current and proposed uses in the City of Manteca is 21,560 AFY. The City has a total supply of 27,219 AFY, leaving 5,659 AFY available. As shown in Table 3.14-5, the proposed Project's water demand is 762 AFY.

A comparison of the City's projected water supplies and demands is shown in Table 3.14-13 for Normal, Single-Dry, and Multiple-Dry Years. The supply-demand difference in Table 3.14-13 indicates that the City will have sufficient water to meet its customers' needs through 2040.

CONCLUSION

The Water Supply Assessment completed for the proposed Project demonstrates that the City's existing and additional potable water supplies are sufficient to meet the City's existing and projected future potable water demands to the year 2040 under all hydrologic conditions.

As identified above, the proposed Project would not result in insufficient water supplies available to serve the Project from existing entitlements and resources. Therefore, the proposed Project would result in a **less than significant** impact to water supplies.

3.14.3 STORM WATER

ENVIRONMENTAL SETTING

Existing City Facilities

The following information was provided in the City of Manteca Storm Drain Master Plan (2013). The City of Manteca provides and maintains a system of storm drains, detention basins, and pumping facilities as well as monitoring and control of the operations of the storm drain system. Additionally, the City enforces storm drain regulations established by the US EPA and the State of California.

The South San Joaquin Irrigation District (SSJID) owns a complex network of irrigation laterals and Drains that run throughout the City limits. These facilities deliver irrigation water to various farming operations in the region, and they convey excess irrigation water and field runoff to downstream receiving waters, specifically the San Joaquin River. The City relies on SSJID's facilities to convey its storm water runoff to the San Joaquin River and will continue to do so through buildout of the City's General Plan.

The City and SSJID have a long-standing agreement that authorizes the City to discharge its storm water runoff into SSJID facilities for ultimate disposal to the San Joaquin River. In 1975 the City first entered into a storm drainage agreement with SSJID, and in 2006 the City renewed its drainage agreement with SSJID. Of the many requirements in the 2006 Agreement, the two most significant new requirements are that all storm water discharges into SSJID facilities must be monitored and controlled such that the capacity of SSJID's facilities is not exceeded, and that storm water quality must be controlled such that it complies with all applicable laws.

The City meets the first requirement by requiring all new development to attenuate its runoff in a storage facility before pumping it into SSJID's facilities. In addition, the City uses real-time water level monitoring stations at critical low points in the conveyance system complete with SCADA (Supervisory Control and Data Acquisition) facilities. Regarding the water quality requirement, the City is classified as a Phase II city by the State Water Resources Control Board. As such, the City, and consequently new development, is required to comply with the State Board's storm water NPDES permit for Phase II cities.

Per the City/SSJID Master Drainage Agreement, SSJID prohibits the direct discharge of storm water runoffs into its facilities. Accordingly, the City requires all new developments to attenuate its runoff in a storage facility before pumping it into SSJID's facilities. For surface attenuation facilities, there are two allowable basin types that may be used for Project site Application: Interim Percolation Basin or a Permanent Detention Basin.

INTERIM PERCOLATION BASIN: RESIDENTIAL AND NON-RESIDENTIAL APPLICATIONS

Percolation basins may be used as an interim measure for retention and disposal of storm water runoff in those areas that will not receive storm drainage service from a major storm drain system by the time development occurs. When discharge capability to a major storm drain system

becomes available, the basins are to be exchanged for or converted to detention basins with pumped discharge facilities. Interim percolation basins are to be sized to store two, 10- year, 48-hour duration storm runoff volumes over the entire contributing area.

PERMANENT DETENTION BASIN: RESIDENTIAL APPLICATIONS

Permanent detention basins in Residential areas are to be sized to hold a 10-year, 48-hour duration storm runoff volume resulting from 3.56 inches of rainfall occurring over the entire contributing area. All basins shall have positive shut-off control. Regional detention basins designed to serve several developments are preferred over smaller, individual basins. Water quality treatment is to be included in detention storage basins to meet stormwater NPDES permit requirements. Detention basins are to be designed as multi-purpose facilities when practical. The volume of detention basins shall be determined with no allowance for percolation or outlet facilities. The full design criteria for permanent detention basins are summarized in Chapter 3 of the City of Manteca Storm Drain Master Plan (2013).

The proposed permanent storm drainage detention basin to be constructed as part of the Cerri Subdivision is intended to be constructed two-feet above the existing groundwater elevation, in accordance with City of Manteca standards and the Storm Drainage Master Plan.

LATERALS FOR STORM WATER CONVEYANCE

As previously described, SSJID owns a complex network of irrigation Laterals and Drains that run throughout the City's limits. The hydraulic connectivity of SSJID's system is as follows: 1) irrigation water is conveyed to farming operations via a vast network of Laterals; 2) the Laterals carry excess irrigation water and field runoff to several Drains; 3) the Drains convey water to a large central drain called the French Camp Outlet Canal (FCOC); and 4) the FCOC conveys water to the San Joaquin River.

A fundamental goal of previous storm drain master plans was to minimize the use of SSJID's Laterals for conveyance of storm water runoff to SSJID's Drains. Accordingly, previous master plans specified the construction of a separate storm water conveyance network that by-passed the Laterals and transported storm drainage directly to the Drains. Once the City's storm water reached the Drains, the Drains would continue to provide conveyance to the FCOC and to the San Joaquin River. In the 2013 SDMP, however, the City recognizes the opportunity to minimize infrastructure costs for all parties by abandoning the concept of separate conveyance systems and instead expanding the use of SSJID's Laterals. Laterals that are targeted to convey both storm water and irrigation water to Drains are called dual-use facilities.

This concept is viable since SSJID's Laterals are 1) found virtually everywhere in the existing and undeveloped areas of the City, 2) most of these Laterals are already 42-inch diameter pipe, which is a sufficient size for the City's drainage needs, and 3) SSJID already requires new development projects that disturb their Laterals to remove, realign and replace that infrastructure with an equal or larger diameter pipeline. For situations where the existing Lateral is 36-inch diameter, and SSJID does not require a 42-inch or larger pipe to be installed as a replacement, the City will require a

minimum 42-inch diameter pipeline to be installed, and the developer will be reimbursed the upsizing cost for the larger diameter pipe via the Public Facilities Implementation Fee (PFIP) program.

Future Storm Water Drainage Demand and System Improvements

The 2013 Storm Drain Master Plan (2013 SDMP) provides a comprehensive planning document to guide improvement and expansion of the City's storm drainage system to meet current and future needs in a safe and reliable manner while maintaining compliance with all applicable regulations. Five planning zones have been identified to define the capital improvements needed to serve future growth: Zones 30, 32, 34, 36 and 39. With the exception of drainage Zone 39, all drainage zones are located in the SSJID service area. The Project site is located in Zone 39, and is not currently served by the SSJID. As a result, the 2013 SDMP identifies a conveyance and disposal system separate from SSJID facilities for this zone. For development in Zone 39, the 2013 SDMP identifies that separate facilities will be constructed to convey the runoff to one regional pump station that will discharge into Walthall Slough, which terminates into the San Joaquin River to the west. The discharge of stormwater must be treated through BMPs prior to its discharge.

However, as an alternative to the construction of a separate facility in Zone 39 to convey the runoff to a regional pump station that will discharge into Walthall Slough, the City of Manteca and the SSJID are currently working on a plan that will include the SSJID annexation Zone 39 (including the Project site) into the SSJID Service District 4. Under this framework the Project site would convey water to the French Camp Outlet Canal (FCOC); and eventually to the San Joaquin River.

Existing Flood Concerns

State floodplain legislation (Senate Bill 5) for the San Joaquin River region has resulted in stricter development standards beginning in 2016. Urban areas that depend on levee protection are required to have a 200-year level of flood protection. SB 5 prohibits a city or county within the Central Valley Flood Protection Plan area from approving a development agreement, discretionary permit or entitlement, tentative map or parcel map for any property within a flood hazard zone unless they can demonstrate any of the following:

- the project has already achieved the applicable level of flood protection,
- conditions have been imposed on the project approval that will eventually result in the applicable level of flood protection, or
- adequate progress is being made towards achievement of the applicable level of flood protection.

Adequate progress is defined as meeting all of the following:

1. The project scope, cost and schedule have been developed;
2. In any given year, at least 90% of the revenues scheduled for that year have been appropriated and expended consistent with the schedule;

3. Construction of critical features is progressing as indicated by the actual expenditure of budget funds;

4. The city or county has not been responsible for any significant delay in completion of the system; and

5. The above information has been provided to the DWR and the Central Valley Flood Protection Board and the local flood management agency shall annually report on the efforts to complete the project.

REGULATORY SETTING

Clean Water Act

The Clean Water Act (CWA) regulates the water quality of all discharges into waters of the United States including wetlands, perennial and intermittent stream channels. Section 401, Title 33, Section 1341 of the CWA sets forth water quality certification requirements for "any applicant applying for a federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters." Section 404, Title 33, Section 1344 of the CWA in part authorizes the U.S. Army Corps of Engineers to:

- Set requirements and standards pertaining to such discharges: subparagraph (e); Issue permits "for the discharge of dredged or fill material into the navigable waters at specified disposal sites": subparagraph (a);

- Specify the disposal sites for such permits: subparagraph (b);

- Deny or restrict the use of specified disposal sites if "the discharge of such materials into such area will have an unacceptable adverse effect on municipal water supplies and fishery areas": subparagraph (c);

- Specify type of and conditions for non-prohibited discharges: subparagraph (f);

- Provide for individual State or interstate compact administration of general permit programs: subparagraphs (g), (h), and (j);

- Withdraw approval of such State or interstate permit programs: subparagraph (i);

- Ensure public availability of permits and permit applications: subparagraph (o);

- Exempt certain Federal or State projects from regulation under this Section: subparagraph (r); and,

- Determine conditions and penalties for violation of permit conditions or limitations: subparagraph (s).

- Section 401 certification is required prior to final issuance of Section 404 permits from the U.S. Army Corps of Engineers.

The California State Water Resources Control Board and RWQCBs enforce State of California statutes that are equivalent to or more stringent than the Federal statutes. RWQCBs are responsible for establishing water quality standards and objectives that protect the beneficial uses of various waters including the San Joaquin River, and other waters in the Manteca Planning Area. In the Manteca Planning Area the RWQCB is responsible for protecting surface and groundwater from both point and non-point sources of pollution. Water quality objectives for all of the water bodies within the Manteca Planning Area were established by the RWQCB and are listed in its Basin Plan.

National Pollutant Discharge Elimination System (NPDES)

National Pollutant Discharge Elimination System (NPDES) permits are required for discharges of pollutants to navigable waters of the United States, which includes any discharge to surface waters, including lakes, rivers, streams, bays, the ocean, dry stream beds, wetlands, and storm sewers that are tributary to any surface water body. NPDES permits are issued under the Federal Clean Water Act, Title IV, Permits and Licenses, Section 402 (33 USC 466 et seq.)

The RWQCB issues these permits in lieu of direct issuance by the Environmental Protection Agency, subject to review and approval by the Environmental Protection Agency Regional Administrator. The terms of these NPDES permits implement pertinent provisions of the Federal Clean Water Act and the Act's implementing regulations, including pre-treatment, sludge management, effluent limitations for specific industries, and anti- degradation. In general, the discharge of pollutants is to be eliminated or reduced as much as practicable so as to achieve the Clean Water Act's goal of "fishable and swimmable" navigable (surface) waters. Technically, all NPDES permits issued by the RWQCB are also Waste Discharge Requirements issued under the authority of the CWA.

These NPDES permits regulate discharges from publicly owned treatment works, industrial discharges, stormwater runoff, dewatering operations, and groundwater cleanup discharges. NPDES permits are issued for five years or less, and are therefore to be updated regularly. The rapid and dramatic population and urban growth in the Central Valley Region has caused a significant increase in NPDES permit applications for new waste discharges. To expedite the permit issuance process, the SWRCB has adopted several general NPDES permits, each of which regulates numerous discharges of similar types of wastes. The SWRCB has issued general permits for stormwater runoff from industrial and construction sites statewide. Stormwater discharges from industrial and construction activities in the Central Valley Region can be covered under these general permits, which are administered jointly by the SWRCB and RWQCB.

A new Phase II Small Municipal Separate Storm Sewer (MS4) General Permit was adopted by the State Water Resources Control Board on February 5, 2013 became effective July 1, 2013. The Permit has numerous new components and the City is required to implement these components in stages over the five-year period of the Permit.

Federal Emergency Management Agency (FEMA)

San Joaquin County is a participant in the National Flood Insurance Program (NFIP), a Federal program administered by FEMA. Participants in the NFIP must satisfy certain mandated floodplain management criteria. The National Flood Insurance Act of 1968 has adopted as a desired level of protection, an expectation that developments should be protected from floodwater damage of the Intermediate Regional Flood (IRF). The IRF is defined as a flood that has an average frequency of occurrence on the order of once in 100 years, although such a flood may occur in any given year. Communities are occasionally audited by the Department of Water Resources to insure the proper implementation of FEMA floodplain management regulations.

Department of Water Resources

The Department of Water Resources' (DWR) major responsibilities include preparing and updating the California Water Plan to guide development and management of the State's water resources, planning, designing, constructing, operating, and maintaining the State Water Resources Development System, protecting and restoring the Sacramento-San Joaquin Delta, regulating dams, providing flood protection, assisting in emergency management to safeguard life and property, educating the public, and serving local water needs by providing technical assistance. In addition, the DWR cooperates with local agencies on water resources investigations; supports watershed and river restoration programs; encourages water conservation; explores conjunctive use of ground and surface water; facilitates voluntary water transfers; and, when needed, operates a State drought water bank.

California Water Code

California's primary statute governing water quality and water pollution issues with respect to both surface waters and groundwater is the Porter-Cologne Water Quality Control Act of 1970 (Division 7 of the California Water Code) (Porter-Cologne Act). The Porter-Cologne Act grants the SWRCB and each of the RWQCBs power to protect water quality, and is the primary vehicle for implementation of California's responsibilities under the Federal Clean Water Act. The Porter-Cologne Act grants the SWRCB and the RWQCBs authority and responsibility to adopt plans and policies, to regulate discharges to surface and groundwater, to regulate waste disposal sites and to require cleanup of discharges of hazardous materials and other pollutants. The Porter-Cologne Act also establishes reporting requirements for unintended discharges of any hazardous substance, sewage, or oil or petroleum product.

Each RWQCB must formulate and adopt a water quality control plan (Basin Plan) for its region the regional plans are to conform to the policies set forth in the Porter-Cologne Act and established by the SWRCB in its State water policy. The Porter-Cologne Act also provides that a RWQCB may include within its regional plan water discharge prohibitions applicable to particular conditions, areas, or types of waste.

The Water Code Section 13260 requires all dischargers of waste that may affect water quality in waters of the state to prepare and provide a water quality discharge report to the RWQCB. Section 13260a-c is as follows:

(a) Each of the following persons shall file with the appropriate regional board a report of the discharge, containing the information that may be required by the regional board:

(1) A person discharging waste, or proposing to discharge waste, within any region that could affect the quality of the waters of the state, other than into a community sewer system.

(2) A person who is a citizen, domiciliary, or political agency or entity of this state discharging waste, or proposing to discharge waste, outside the boundaries of the state in a manner that could affect the quality of the waters of the state within any region.

(3) A person operating, or proposing to construct, an injection well.

(b) No report of waste discharge need be filed pursuant to subdivision (a) if the requirement is waived pursuant to Section 13269.

(c) Each person subject to subdivision (a) shall file with the appropriate regional board a report of waste discharge relative to any material change or proposed change in the character, location, or volume of the discharge.

Water Quality Control Plan for the Central Valley Region

The Water Quality Control Plan for the Central Valley Region (Basin Plan) includes a summary of beneficial water uses, water quality objectives needed to protect the identified beneficial uses, and implementation measures. The Basin Plan establishes water quality standards for all the ground and surface waters of the region. The term "water quality standards," as used in the Federal Clean Water Act, includes both the beneficial uses of specific water bodies and the levels of quality that must be met and maintained to protect those uses. The Basin Plan includes an implementation plan describing the actions by the RWQCB and others that are necessary to achieve and maintain the water quality standards.

The RWQCB regulates waste discharges to minimize and control their effects on the quality of the region's ground and surface water. Permits are issued under a number of programs and authorities. The terms and conditions of these discharge permits are enforced through a variety of technical, administrative, and legal means. Water quality problems in the region are listed in the Basin Plan, along with the causes, where they are known. For water bodies with quality below the levels necessary to allow all the beneficial uses of the water to be met, plans for improving water quality are included. The Basin Plan reflects, incorporates, and implements applicable portions of a number of national and statewide water quality plans and policies, including the California Water Code and the Clean Water Act.

200-Year Flood Protection in Central Valley

Both State policy and recently enacted State legislation (Senate Bill 5) call for 200-year (0.5% annual chance) flood protection to be the minimum level of protection for urban and urbanizing areas in the Central Valley. Senate Bill 5 (SB5) requires that the 200-year protection be consistent

with criteria used or developed by the Department of Water Resources. SB 5 requires all urban and urbanizing areas in the Sacramento and San Joaquin Valleys to achieve 200-year flood protection in order to approve development. The new law restricts approval of development after 2015 if "adequate progress" towards achieving this standard is not met. Urban and urbanizing areas protected by State-Federal project levees cannot use "adequate progress" as a condition to approve development after 2025.

The levee system is designed to a 100-year protection standard; however, RD-17 has been working with the Department of Water Resources (DWR) and the Central Valley Flood Protection Board (CVFPB) to analyze 200-year protection. RD-17 acquired land along the levee system to construct the 100-year improvements, and that land is anticipated to provide sufficient space for any additional incremental improvements to provide 200-year protection in the future. The City of Manteca has adopted an update to the Safety Element and the Zoning Ordinance to address the 200-year flood issues. Additionally, the City has adopted an adequate progress finding and is moving forward with the design and funding of improvements to the levee system to ensure 200-year protection in the future. A small portion of the Project site is located within the 100-year flood plain. The remainder of the Project site is not directly affected by this issue.

RD 17 Area: Adequate Progress Report for Urban Level of Protection

The Cities of Lathrop and Manteca have prepared the Adequate Progress Report document as a coordinated effort with RD 17 to support the demonstration of "Adequate Progress" toward the achievement of an Urban Level of Flood Protection (ULOP) within the RD 17 basin. Together with RD 17, the Cities comprise the acting Local Flood Management Agency (LFMA) for the RD 17 basin. The Adequate Progress Report document serves as a strategic plan that describes and outlines the steps that the LMFA and the land use agencies in the RD 17 basin are taking to generate the local funding needed to advance and ultimately implement 200-Year Levee Improvements in accordance with the requirements of SB 5 (2007).

City of Manteca General Plan

GOAL: MAJOR DRAINAGE

- PF-9. Maintain an adequate level of service in the City's drainage system to accommodate runoff from existing and projected development and to prevent property damage due to flooding.

POLICIES: MAJOR DRAINAGE

- PF-P-26. The City shall continue to complete gaps in the drainage system in areas of existing development.
- PF-P-27. The City shall require the dedication and improvement of drainage detention basins as a condition of development approval according to the standards of the Drainage Master Plan. The responsibility for the dedication and improvement of detention basins shall be based on the prorated share of storm water runoff resulting from each development.

- PF-P-28. Storm drainage systems within new development areas shall include open drainage corridors where feasible to supplement or replace an underground piped drainage system. The drainage systems would provide for short-term storm water detention, storm water conveyance for storm waters exceeding a 10-year event, storm water quality treatment, bike and pedestrian paths, and visual open space within neighborhoods. The width and length of the corridors would be determined by the storm water management requirements. The drainage systems would provide a pedestrian connection between parks and access to open space from residential neighborhoods. The neighborhoods would be designed with homes oriented to, rather than backing on the open space corridor.

IMPLEMENTATION: MAJOR DRAINAGE

- PF-I-13. The City shall update the Storm Drainage Master Plan and Public Facilities Implementation Plan, regarding water supply and distribution, every five years. The update shall be reviewed annually for adequacy and consistency with the General Plan.

POLICIES: FLOOD SAFETY

- S-P-7. Periodically review and update when necessary, the General Plan Safety Element goals, policies, and implementation measures in order to maintain compliance with applicable Federal and State requirements.
- S-P-8. Maintain and periodically update, City flood safety plans, floodplain management ordinances, zoning ordinance, building codes and other related sections of the Manteca Municipal Code to reflect Safety Element goals, policies and standards, applicable Federal and State law, and National Flood Insurance Program requirement.
- S-P-9. The City shall require evaluation of potential flood hazards prior to approval of development projects to determine whether the proposed development is reasonably safe from flooding and consistent with California Department of Water Resources (DWR) Urban Level of Flood Protection Criteria. The City shall not approve the execution of a development agreement, a tentative map, or a parcel map for which a tentative map is not required, or a discretionary permit or other discretionary entitlement that would result in the construction of a new building, or construction that would result in an increase in allowed occupancy for an existing building, or issuance of a ministerial permit that would result in the construction of a new residence for property that is located within a 200-year flood hazard zone, unless the adequacy of flood protection as described in Government Code §65865.5(a), 65962(a), or 66474.5(a), has been demonstrated.
- S-P-10. The City may permit new development in areas not identified as "urban" or "urbanizing" provided that they are protected from 100-year flooding by FEMA-accredited levees or equivalent flood protection as shown on an adopted FEMA FIRM, a FEMA-approved Letter of Map Revision (LOMR) or a Conditional Letter of Map Revision (CLOMR), subject to conditions specified in the CLOMR.
- S-P-11. The City may permit new development in areas not protected by FEMA-accredited 100-year levees subject to all applicable requirements of Manteca Municipal Code Chapter

8.30 (Floodplain Management), the California Building Standards Code as adopted by the City, and the latest promulgated FEMA standards for development in the 100-year floodplain, provided that new development approval will not cause the project site or area to be defined as "urban" or "urbanizing."

- S-P-12. Work closely with the City of Lathrop, and the local reclamation districts to improve levee systems as required to provide ULOP for urban and urbanizing areas in Manteca by 2025, and to provide the basis for findings of "adequate progress" toward that objective based on substantial evidence as soon as possible.
- S-P-13. The City shall continue to cooperate with local, regional, State, and Federal agencies in securing funding to obtain the maximum level of flood protection that is practical, with a goal of achieving 200-year flood protection for all areas of the City.
- S-P-14. Maintain active participation in the National Flood Insurance Program (NFIP).
- S-P-15. The City shall maintain eligibility in the Federal Emergency Management Agency's (FEMA's) Community Rating System (CRS) program, which gives property owners discounts on flood insurance.
- S-P-15. The City shall maintain eligibility in the Federal Emergency Management Agency's (FEMA's) Community Rating System (CRS) program, which gives property owners discounts on flood insurance.
- S-P-16. Provide technical assistance and encourage landowners within the FEMA Special Flood Hazard Area (100-year floodplain) to purchase and maintain flood insurance.
- S-P-17. Ensure that the impacts of potential flooding are adequately analyzed when considering areas for future urban expansion.
- S-P-18. Provide opportunities for review of and comment by the reclamation districts, Manteca Police Services, Manteca Fire Department, the Lathrop Manteca Fire District for comment during new development project review.
- S-P-19. Consider the risks of catastrophic dam failure in the planning and environmental review of new development projects.
- S-P-20. Incorporate riparian habitat protection, mitigation or enhancement into flood protection improvements to maintain existing floodwater capacity where feasible.
- S-P-21. Combine flood control, recreation, water quality, and open space functions where feasible.
- S-P-22. Discourage large continuous paved areas unless provided with engineered drainage facilities, and where feasible, require the use of pervious paving materials.
- S-P-23. When improvements to existing developments are made costing at least 50 percent of the current market value of the structure before improvements, structures shall be brought into compliance with relevant FEMA standards.
- S-P-24. The City shall require, for areas protected by levees, all new developments to include a notice within the deed that the property is protected from flooding by a levee and that the property can be subject to flooding if the levee fails or is overwhelmed by floodwater flow.
- S-P-25. The City shall update flood hazard maps as necessary to reflect impacts from climate change in terms of long-term flood safety and long-term flood event probabilities.

City of Manteca Municipal Code

TITLE 13 CHAPTER 13.28 STORM WATER MANAGEMENT DISCHARGES

The purpose of this chapter is to establish minimum storm water management requirements and controls to protect and safeguard the general health, safety and welfare of the public residing in watersheds within the city of Manteca. This chapter seeks to meet that purpose through the following objectives:

A. Minimize increases in storm water runoff from any development in order to reduce flooding, siltation and stream bank erosion and maintain the integrity of drainage channels;

B. Minimize increases in non-point source pollution caused by storm water runoff from development that would otherwise degrade local water quality;

C. Minimize the total annual volume of surface water runoff that flows from any specific site during and following development to not exceed the pre-development hydrologic regime to the maximum extent practicable; and

D. Reduce storm water runoff rates and volumes, soil erosion and non-point source pollution wherever possible, through storm water management controls and to ensure that these management controls are properly maintained and pose no threat to public safety. (Ord. 1253 § 1, 2004)

TITLE 13 CHAPTER 13.28 SECTION 13.28.060 DISCHARGES IN VIOLATION OF INDUSTRIAL OR CONSTRUCTION ACTIVITY NPDES STORM WATER DISCHARGE PERMIT.

A. Any person subject to an industrial NPDES storm water discharge permit shall comply with all provisions of such permit. Proof of compliance with said permit may be required in a form acceptable to the director upon inspection of the facility, during any enforcement proceeding or action or for any other reasonable cause.

B. Any person subject to a construction activity NPDES storm water discharge permit shall comply with all provisions of such permit. Proof of compliance with said permit may be required in a form acceptable to the director prior to or as a condition of a subdivision map, site plan, building permit or development or improvement plan; upon inspection of the facility; during any enforcement proceeding or action; or for any other reasonable cause. Prior to issuance of a construction permit a copy of the Notice of Intent (NOI) and the Storm Water Pollution Prevention Plan (SWPPP) shall be submitted to the city. (Ord. 1253 § 1, 2004).

TITLE 17 CHAPTER 17.30 SECTION 17.30.040 200-YEAR FLOODPLAIN (F-200) OVERLAY ZONE.

Section 17.30.040, 200-Year Floodplain (F-200) Overlay Zone, of Chapter 17.30 of the Municipal Code delineates the extents of the 200-Year Floodplain and is intended to comprise all known land subject to 200-year flooding within the City. All lands within the F-200 Overlay Zone shall be required to comply with all provisions of subsection C. The purpose of the 200-Year Floodplain (F-

200) Overlay Zone is to comply with provisions of State law that require the City to make specific findings prior to approving certain projects located within a 200-year flood hazard area. The F-200 Zone establishes a process for the consideration and regulation of areas subject to 200-year flooding that require special planning to provide for appropriate development. Because the Project site is within the 200-year flood zone, Subsection C of Section 17.30.040 applies to the Project.

Subsection C of Section 17.30.040 states that:

> *The review authority shall not approve the execution of a development agreement, a tentative map, or a parcel map for which a tentative map is not required, or a discretionary permit or other discretionary entitlement that would result in the construction of a new building, or construction that would result in an increase in allowed occupancy for an existing building, or issuance of a ministerial permit that would result in the construction of a new residence for property that is located within the F-200 Zone unless the review authority finds, based on substantial evidence in the record, one of the following:*
>
> 1. *The facilities of the State Plan of Flood Control or other flood management facilities protect the property to the urban level of flood protection in urban and urbanizing areas;*
> 2. *The City has imposed conditions on a development agreement, map, permit, or entitlement that will protect the property to the urban level of flood protection in urban and urbanizing areas;*
> 3. *The local flood management agency has made adequate progress (as defined in California Government Code Section 65007) on the construction of a flood protection system that will result in flood protection equal to or greater than the urban level of flood protection in urban or urbanizing areas; or*
> 4. *The property is located in an area of potential flooding of three feet or less from a storm event that has a one in two hundred chance of occurring in any given year, from sources other than local drainage, in urban and urbanizing areas.*

Utility Master Plans

The City of Manteca maintains a variety of Master Plan documents that guide the design, development, and maintenance of the utilities within the city limits. These include: *Urban Water Management Plan* (2015), *Water Master Plan* (2005), *Storm Drain Master Plan* (2013) *Wastewater Collection System Master Plan* (2012), *Wastewater Quality Control Facility Master Plan Update* (2006), *Draft Sewer Rate Study* (2008).

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the proposed Project may have a significant impact on the environment associated with Utilities if it would:

1. Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

IMPACTS AND MITIGATION MEASURES

Impact 3.14-6: The proposed Project has the potential to require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. (Less than Significant with Mitigation)

While it is anticipated at this time that the joint effort of the Manteca, Lathrop, and Reclamation District 17 will ultimately ensure compliance with the 200-year flood protection requirements of SB-5, it is possible that the timing of improvements do not materialize by the deadline in 2016. If this happened, it would prevent the Project from continuing to build until such time that the improvements are underway. The construction of flood protection improvements associated with the SB-5 requirements is analyzed in Section 3.9, Hydrology and Water Quality. The actual environmental impacts associated with the construction of any 200-year flood plain improvements are not practicable at this time because the details of such improvements are unknown. Any improvements would require its own independent CEQA review, at which time a full analysis of the environmental impacts would be performed.

Flooding events can result in damage to structures, injury or loss of human and animal life, exposure of waterborne diseases, and damage to infrastructure. In addition, standing floodwater can destroy agricultural crops, undermine infrastructure and structural foundations, and contaminate groundwater. The RD-17 levee system is designed to a 100-year protection standard. The Project site is currently located in Zone X, protected by levee, which by definition indicates an area protected by levees from the 1% annual chance flood. The majority of the Project site is currently located in Zone X (shaded), 500-year flood zone, which by definition indicates an area protected by levees from the 1% annual chance flood. The southernmost portion of the Project site is located within Zone A, meaning this portion of the site is located within a 100-year flood zone. Additionally, the entire Project site is located within the 200-year composite flood plain.

Onsite storm drainage would be installed to serve the proposed Project. As shown in Figure 2.0-11, development of the proposed Project would include construction of a new storm drainage system, including a drainage collection system, storm drain pump stations, and detention basins. It is noted that the locations of the proposed detention basins are conceptual. Stormwater resulting from the future HDR portion of the Project would be diverted to the Oakwood Trails Subdivision storm drainage system, which will be developed adjacent west of the Project site in the future. The Oakwood Trails Subdivision includes two neighborhood park drainage basins, totaling approximately 15.67 acres.

All on-site storm drainage runoff will be collected through drain inlets in the landscaped areas and catch basins along the streets and within properties, and conveyed via surface swales and underground trunk lines to the detention and water quality basins. The storm water drainage detention basins will be constructed to meet the City of Manteca Standards. Discharge from the

basins will be conveyed through controlled flow pumping facilities to existing City of Manteca and SSJID dual use main storm drain laterals.

Installation of the Project's storm drainage system will be subject to current City of Manteca Design Specifications and Standards. The proposed storm drainage collection and detention system will be subject to the SWRCB and City of Manteca regulations, including: Manteca Storm Drain Master Plan, 2013; Phase II, NPDES Permit Requirements; NPDES-MS4 Permit Requirements; and LID Guidelines.

The City requires detention basins to help attenuate peak flows before drainage discharge is pumped into SSJID's facilities. Delaying the release of water over longer periods of time further reduces the potential of downstream flooding. Most of the proposed detention basins are joint-use facilities providing recreation and other uses when not being used for stormwater detention.

The proposed public storm drainage and water quality system is planned to function independently from surrounding developments. An internal layout of stormwater collection pipes with various sizes, as necessary, will be installed within the Project site. Installation of the Project's storm drainage system will be subject to current City of Manteca Design Specifications and Standards. The proposed storm drainage collection and detention system will be subject to the SWRCB requirements and City of Manteca regulations, including: Manteca Storm Drain Master Plan, 2013; Phase II, NPDES Permit Requirements; NPDES-MS4 Permit Requirements; and LID Guidelines.

Stormwater quality standards imposed and monitored by the EPA and the SWRCB through the City's NPDES permit require treatment of stormwater runoff prior to its release into natural drainage features or dual use SSJID and City Laterals. Stormwater quality is an integral part of the City's stormwater management system. Most existing stormwater is pumped into the dual use SSJID and City laterals and drains.

The City requires detention basins to help attenuate peak flows before drainage discharge is pumped into SSJID's facilities. Delaying the release of water over longer periods of time further reduces the potential of downstream flooding. The proposed detention basins are joint-use facilities providing recreation and other uses when not being used for stormwater detention.

Because the Project site could increase runoff significantly, and create downstream drainage problems, Project impacts to stormwater are considered potentially significant. The following mitigation measure requires the Project applicant to install a drainage system that meets this performance standard and, prior to issuance of grading permits, provide a drainage plan and report to the City of Manteca for review and approval. With the implementation of the following mitigation measures, drainage impacts would be reduced to **less than significant**.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.9-3.***

Mitigation Measure 3.14-2*: Prior to the issuance of a building or grading permit, the Project applicant shall submit a drainage plan to the City of Manteca for review and approval. The plan shall include an engineered storm drainage plan that demonstrates attainment of pre-Project runoff requirements and describes the volume reduction measures and treatment controls used to reach attainment consistent with the Manteca Storm Drain Master Plan.*

Mitigation Measure 3.14-3: *Prior to the issuance of a building or grading permit, the Project applicant shall prepare a storm drainage plan in accordance with the City of Manteca Storm Drain Master Plan effective at the time of approval. The Project applicant shall cooperate with the City to resolve the current Zone 39 discharge solution, but may utilize an interim drainage plan in accordance with the currently approved Storm Drain Master Plan if the Zone 39 discharge solution is not finalized when the project drainage plan is submitted for approval. At the direction of the City of Manteca, once the solution has been identified, the Project applicant shall fund their fair share of the solution's development and implementation. If the Zone 39 storm discharge solution improvements have been incorporated into the PFIP, then the Project applicant shall pay their fair share by paying the amended Zone 39 Storm Drain PFIP fee.*

3.14.4 SOLID WASTE

ENVIRONMENTAL SETTING

The City of Manteca Solid Waste Division (SWD) provides solid waste hauling service for the City of Manteca and would serve the proposed Project. The SWD consists of more than 30 employees, including a SWD Superintendent, yard personnel, office staff, and recycling coordinators. SWD's services include residential and commercial trash pick-up, residential and commercial recycling pick-up, green waste pick-up, and hazardous waste collections.

Commercial size containers ranging from two cubic yards to six cubic yards are available for commercial trash. Larger drop box containers from 10 cubic yards to 40 cubic yards are also available. Driers operate front-loaders on commercial trash pickup routes. SWD also provides commercial recycling in businesses and can arrange pick-up services from once a week to five times per week depending on the needs of the business. Commercial recycling bins are for co-mingled recycling, which allows materials to be mixed in one container and then sorted after the hauler takes the materials to a sorting facility where the materials are separated for recycling. The City of Manteca does not have a sorting facility; however, the solid waste transferred to the Forward Landfill is sorted onsite. SWD provides commercial green waste services with green waste bins ranging in size from two cubic yards to four cubic yards. Similar to recycling pick-up service, green waste can be arranged to be picked up once, or up to five times per week.

Residential trash is picked up on a weekly basis. Residents may choose which size trash collection toter they want to use (32-gal, 64-gal or 96-gal). Residential recycling is picked up on a bi-weekly schedule, alternating with green waste.

Solid waste from Manteca is primarily landfilled at the Forward Sanitary Landfill, located northeast of Manteca. Other landfills used include Foothill Sanitary and North County. All three landfills are summarized in Table 3.14-14 below. Table 3.14-15 summarizes the City of Manteca's disposal rate targets, as identified by Cal Recycle.

TABLE 3.14-14: CITY OF MANTECA LANDFILL SUMMARY

LANDFILL	*LOCATION*	*MAXIMUM DAILY THROUGHPUT (TONS/DAY)*	*REMAINING CAPACITY (CUBIC YARDS)*	*ANTICIPATED CLOSURE DATE*
Forward Sanitary	Manteca	8,668	23.7 Million	2020
Foothill Sanitary	Linden	1,500	125.0 Million	2054
North County	Victor	825	35.4 Million	2035

SOURCE: CAL RECYCLE 2016.

TABLE 3.14-15: CITY OF MANTECA WASTE DISPOSAL RATE TARGETS (POUNDS/DAY)

POPULATION		*EMPLOYMENT*	
Target	Annual	Target	Annual
5.6	4.7	21.1	19.1

SOURCE: CAL RECYCLE 2014.

REGULATORY SETTING

AB 939: California's Integrated Waste Management Act of 1989

California's Integrated Waste Management Act of 1989 (AB 939) set a requirement for cities and counties to divert 50 percent of all solid waste from landfills by January 1, 2000, through source reduction, recycling and composting. In order to achieve this goal, AB 939 requires that each City and County prepare and submit a Source Reduction and Recycling Element. AB 939 also established the goal for all California counties to provide at least 15 years of ongoing landfill capacity.

AB 939 also established requirements for cities and counties to develop and implement plans for the safe management of household hazardous wastes. In order to achieve this goal, AB 939 requires that each city and county prepare and submit a Household Hazardous Waste Element.

AB 341 (75 Percent Solid Waste Diversion)

AB 341 requires CalRecycle to issue a report to the Legislature that includes strategies and recommendations that would enable the state to divert 75 percent of the solid waste generated in the state from disposal by January 1, 2020, requires businesses that meet specified thresholds in the bill to arrange for recycling services by January 1, 2012, and also streamlines various regulatory processes.

SB 1374 (Construction and Demolition Waste Materials Diversion)

Senate Bill 1374 (SB 1374), Construction and Demolition Waste Materials Diversion Requirements, requires that jurisdictions summarize their progress realized in diverting construction and demolition waste from the waste stream in their annual AB 939 reports. SB 1374 required the CIWMB to adopt a model construction and demolition ordinance for voluntary implementation by local jurisdictions.

AB 2176 (Montanez, Chapter 879, Statues of 2004)

This law requires the largest venue facilities and events (as defined) in each city and county to plan and implement solid waste diversion programs, and annually report the progress of those upon the request of their local government. In turn, local jurisdictions must report to the CIWMB waste diversion information for the top 10 percent of venues and events by waste generation.

A large event is defined as:

1. Serves an average of more than 2,000 individuals per day of operation (both people attending the event and those working at it—including volunteers—are included in this number); and

2. Charges an admission price or is run by a local agency.

The bill specifically includes public, nonprofit, or privately owned parks, parking lots, golf courses, street systems, or other open space when being used for an event, including, but not limited to, a sporting event or a flea market in addition to events that meet both of the above.

A large venue is defined as:

- A permanent facility that annually seats or serves an average of more than 2,000 individuals within the grounds of the facility per day of operation (both people attending the event and those working at it—including volunteers too—are included in this number).

Venues include, but are not limited to airports, amphitheaters, amusement parks, aquariums, arenas, conference or civic centers, fairgrounds, museums, halls, horse tracks, performing arts centers, racetracks, stadiums, theaters, zoos, and other public attraction facilities.

California Green Building Standards Code (CALGreen)

CALGreen requires the diversion of at least 50 percent of the construction waste generated during most new construction projects (CALGreen Sections 4.408 and 5.408) and some additions and alterations to nonresidential building projects.

City of Manteca General Plan

GOAL: SOLID WASTE

- PF-12. Maintain efficient, effective and economical solid waste services for the residents, businesses and visitors to Manteca.

POLICIES: SOLID WASTE

- PF-P-31. The City will implement and enforce the provisions of its Source Reduction and Recycling Element.
- PF-P-32. The City shall support the continued use of the Lovelace Transfer Station on Lovelace Road, between Union Road and Airport Way, for the processing and shipping of solid waste materials.

City of Manteca Municipal Code, Chapter 8.12

Chapter 8.12 of the Municipal Code regulates the management of garbage, recyclables, and other wastes. Chapter 8.12 sets forth solid waste collection, disposal, and diversion requirements for residential, commercial, industrial, and other uses and addresses yard waste, hazardous materials, recyclables, and other forms of solid waste.

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the proposed Project will have a significant impact on the environment associated with Utilities if it will:

1. Be served by a landfill with sufficient permitted capacity to accommodate the Project's solid waste disposal needs.

2. Comply with federal, State, and local statutes and regulations related to solid waste.

IMPACTS AND MITIGATION MEASURES

Impact 3.14-7: The proposed Project has the potential to be served by a landfill with sufficient permitted capacity to accommodate the Project's solid waste disposal needs and comply with federal, State, and local statutes and regulations related to solid waste. (Less than Significant with Mitigation)

As previously described, permitted maximum disposal at the Forward Landfill is 8,668 tons per day. The total permitted capacity of the landfill is 51.04 million cubic yards, which is expected to accommodate an operational life until January 1, 2020. The remaining capacity is 23,700,000 cubic yards. Solid waste generated by the proposed Project was estimated based on CalRecycle generation rate estimates by use (discussed below).

The General Commercial area is estimated to generate roughly five pounds per day per 1,000 square feet. It is estimated that the 237,838 square feet of commercial space would generate 1,189 pounds per day of solid waste. Note, this estimate of the square footage for the commercial space is considered a worst-case scenario and may very well prove to be an overestimate.

The Residential portion of the Project site is estimated to generate roughly 10 pounds per day per household. It is estimated that the proposed 1,265 residential units would generate 12,650 pounds per day of solid waste.

The total solid waste generated by the proposed project is estimated to be 6.92 tons per day. As previously described, solid waste generated in the City is disposed at the Forward Landfill. This landfill is projected to close in the year 2020. At that time the City can utilize the Foothill Landfill as a location for solid waste disposal. The City's solid waste per capita generation has decreased since 2007 due to the waste diversion efforts of the City. The permitted maximum disposal at the Forward Landfill is 8,668 tons per day. Currently, the average daily disposal is 620 tons per day. The total permitted capacity of the landfill is 51.04 million cubic yards. The addition of solid waste associated with the proposed Project, approximately 6.92 tons per day at total buildout, to the Forward Landfill would not exceed the landfill's remaining capacity. The City will need to secure a new location of disposal of all solid waste generated in the City when the Forward landfill is ultimately closed. There are several options that the City will have to consider for solid waste disposal at that time which is estimated to be 2020. Because the Project would increase the local waste stream, and require the city to invest in additional resources for the collection and disposal of solid waste; local impacts to solid waste are considered potentially significant. The following mitigation measure requires the payment of a solid waste connection fee prior to issuance of grading permits. With the implementation of the following mitigation measure, potential solid waste impacts would be reduced to **less than significant**.

MITIGATION MEASURE(S)

Mitigation Measure 3.14-4*: Prior to the issuance of a building or grading permit, the Project applicant shall be subject to contribute the Project's fair share payment towards the City's waste connection fee program.*

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Figure 3.14-1: City of Manteca Future Potable Water Supply vs. Demand in Normal Years

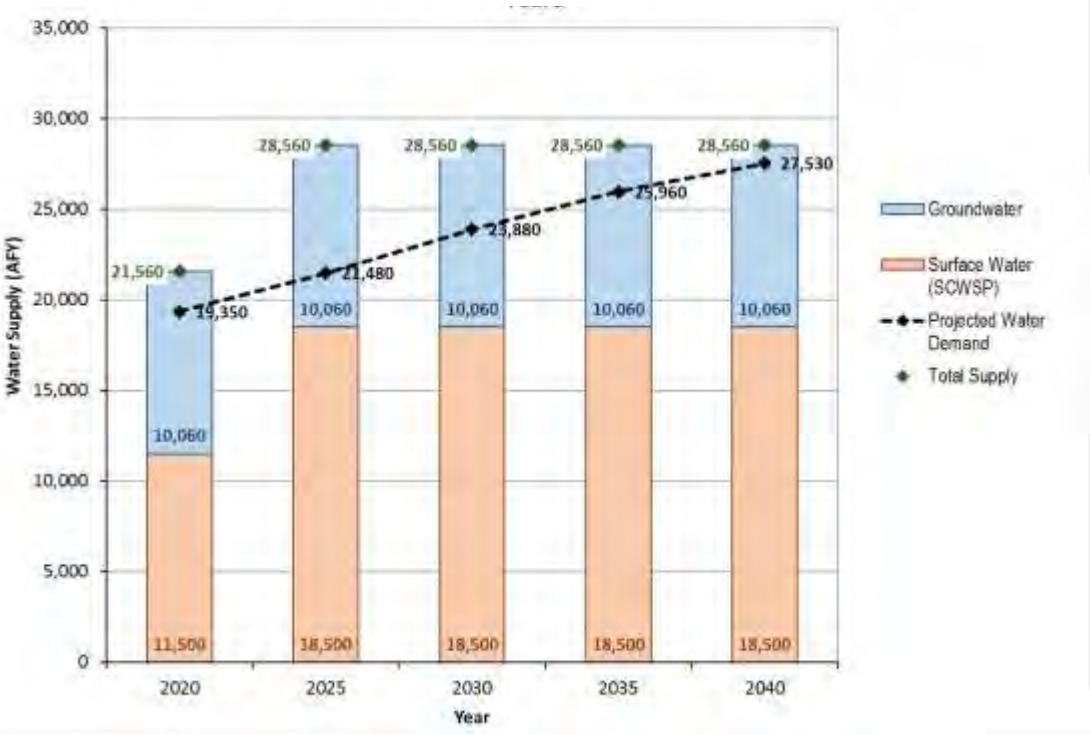
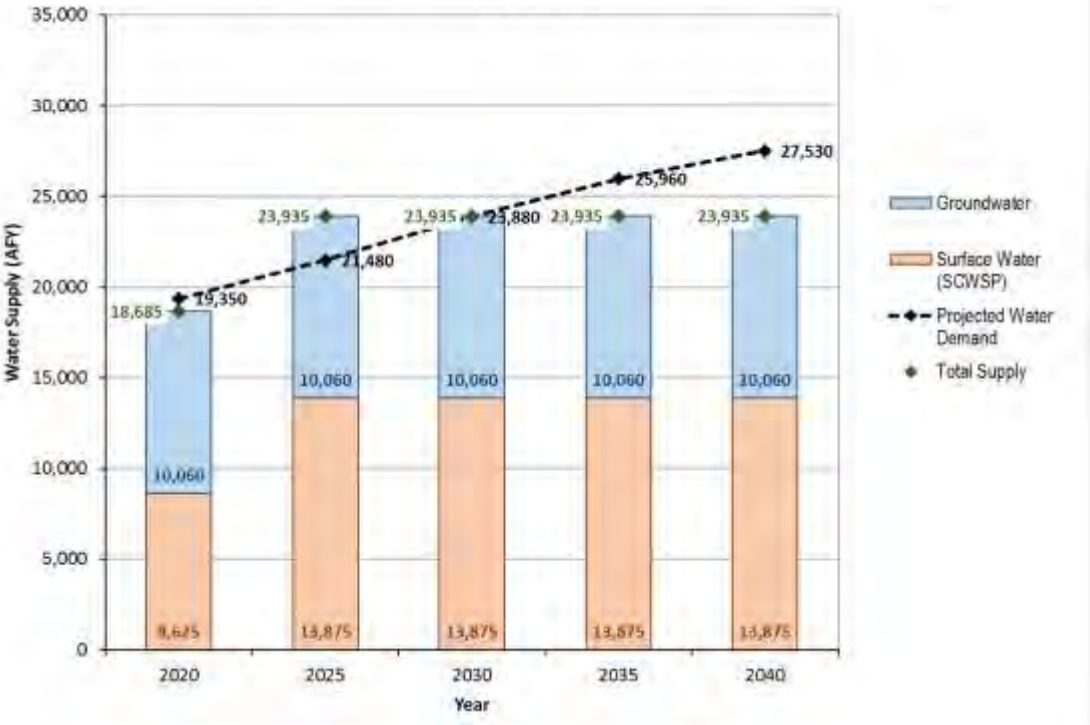


Figure 3.14-2: City of Manteca Future Potable Water Supply vs. Demand in Single-Dry Years

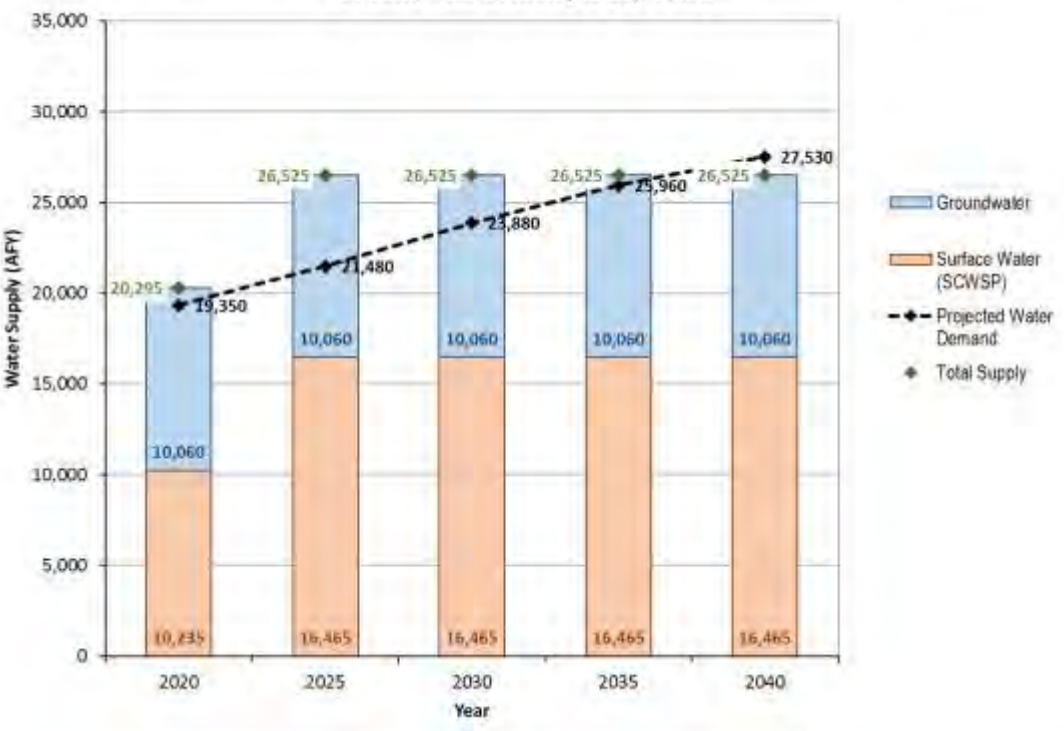


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Figure 3.14-3: City of Manteca Future Potable Water Supply vs. Demand in the First Year of Multiple-Dry Years



Figure 3.14-4: City of Manteca Future Potable Water Supply vs. Demand in the Second Year of Multiple-Dry Years



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CEQA requires an EIR to evaluate a project's effects in relationship to broader changes occurring, or that are foreseeable to occur, in the surrounding environment. Accordingly, this chapter presents a discussion of CEQA-mandated analysis for cumulative impacts, significant irreversible effects, and significant and unavoidable impacts associated with the proposed Project.

4.1 CUMULATIVE SETTING AND IMPACT ANALYSIS

INTRODUCTION

The California Environmental Quality Act (CEQA) requires that an Environmental Impact Report (EIR) contain an assessment of the cumulative impacts that could be associated with the proposed project. According to CEQA Guidelines Section 15130(a), "an EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable." "Cumulatively considerable" means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (as defined by Section 15130). As defined in CEQA Guidelines Section 15355, a cumulative impact consists of an impact that is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts. A cumulative impact occurs from:

> *…the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.*

In addition, Section 15130(b) identifies that the following three elements are necessary for an adequate cumulative analysis:

1) Either:

(A) A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency; or,

(B) A summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or area wide conditions contributing to the cumulative impact. Any such planning document shall be referenced and made available to the public at a location specified by the lead agency.

2) A summary of the expected environmental effects to be produced by those projects with specific reference to additional information stating where that information is available; and

3) A reasonable analysis of the cumulative impacts of the relevant projects. An EIR shall examine reasonable, feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects.

Where a lead agency is examining a project with an incremental effect that is not "cumulatively considerable," a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable.

CUMULATIVE SETTING

The cumulative setting uses growth projections listed in the general plan, municipal services review, other planning documents and Department of Finance statistics. Table 4.0-1 shows growth projections.

TABLE 4.0-1: GROWTH PROJECTIONS

CALENDAR YEAR	*ESTIMATED POPULATION (MANTECA)*	*ESTIMATED POPULATION (SAN JOAQUIN COUNTY)*	*ESTIMATED POPULATION (CALIFORNIA)*
2015	72,169	723,506	38,896,969
2020	80,900	766,644	40,619,346
2025	90,690	822,755	42,373,301
2030	101,660	893,354	44,085,600
2035	113,960	966,889	45,747,645
2040	127,740	1,037,761	47,233,240

SOURCES: CITY OF MANTECA (2016), DEPARTMENT OF FINANCE (2016)

In addition to those cumulative growth projections listed above, this EIR uses a list of past, present, and probable future projects within the City of Manteca to determine cumulative growth in the area. The list of past, present, and probable future projects used for this cumulative analysis is restricted to those projects that are planned to occur within the City of Manteca, and San Joaquin County. In general, these areas have large areas of undeveloped land previously used for agriculture but that have been rezoned for future residential, commercial and industrial uses. There are several large development projects planned in the regional vicinity. For the purposes of this discussion, the projects that may have a cumulative effect on the resources in the Project site will often be referred to as the "related projects." The related projects are described below. The approved and/or pending projects include:

1. Terra Ranch: The project would result in 409 dwelling units located directly west of Machado Estates.
2. Oakwood Shores: The project would result in a partially developed residential project (475 dwelling units at build-out) located south of the Project site on Oakwood Lane that has two access locations on Woodward Avenue west of McKinley Avenue.
3. Manteca Trails: The project would result in 1,651 dwelling units located south of Woodward Avenue and west of McKinley Avenue.
4. Lathrop Gateway Business Park: The project site is situated north of SR 120 between Yosemite Avenue and McKinley Avenue. The project could yield a maximum of 5.43 million square feet of non-residential uses, according to that project's EIR.

5. Crossroads Commerce Center and Industrial Park: This project is located on a site south of Louise Avenue between Howland and Harlan Roads in East Lathrop and comprises 450 acres of Industrial and 48 acres of Highway Commercial-designated land. The industrial area includes an existing 750,000-square-foot Del Monte distribution warehouse, a 430,770-square-foot Daimler Chrysler facility, three 250,000-square foot warehouses, a 435,000-square-foot Longs Drugs warehouse, a plastic extrusion plant for Fuel Total Systems, a sausage-making company (Swiss American), a cross dock and warehouse for Home Depot, and a trucking terminal for Swift Trucking. The Freeway Commercial area contains the existing 138,000-square-foot Lathrop Business Park, four fast-food restaurants, a sit-down restaurant, and a 31,886-square-foot hotel.
6. Historic Lathrop Infill and Other Developments East of I-5: The portion of the City east of Interstate (I-5) is anticipated to expand and add density in the future. Currently, this area consists of approximately 2,886 low density and 78 medium density units, commercial and industrial areas, and a few public parks. Future residential growth of this area is expected on undeveloped/underutilized and redeveloped parcels consolidated from large lots where low density residential units would be demolished. All new residential projects are projected to consist of medium density residential units (i.e., small lot sizes). By General Plan buildout, the area will consist of 2,746 low-density and 894 medium-density residential units increasing the total existing residential unit count by 1,112 total units.
7. Central Lathrop Specific Plan: The Central Lathrop Specific Plan proposes development of 1,520 acres located west of Interstate 5. Project completion was anticipated by 2025. The Specific Plan proposes approximately 6,790 low-, medium- and high-density residential units and 11.5 acres of office/commercial land uses. The project also includes two schools and 200 acres of recreational land use and open space.
8. River Islands: The 4,995-acre River Islands development would be located west of the San Joaquin River on Stewart Tract and Paradise Cut. The development proposes a mixture of low-, medium- and high-density residential units. In total, River Islands would consist of 11,000 homes. The development also proposes a 260-acre employment center, a 47-acre town center, 265 acres of parks and two schools. The completion date for this project is 2030.
9. Manteca Family Entertainment Zone (FEZ). The project site is located to the north and west of the Stadium Shopping Center, to the west of Milo Candini Drive, to the east of McKinley Avenue, to the south of the City of Manteca Wastewater Quality Control Facility (WQCF), and to the north of State Route 120. The Plan will encompass multiple projects and parcels that in the aggregate will provide an extensive park and recreation complex featuring 189 acres of new and existing recreational, park, water, sports and other leisure amenities.
10. South of Woodward Avenue North Project: The project site is bounded by E. Woodward Avenue to the north, the proposed Hat Ranch project to the south, agricultural land and the future Atherton Drive extension to the east, and Pillsbury Road to the west. The approximately 191.3-acre project includes the residential development of 706 units.
11. Hat Ranch Active Adult Community: The approximately 184-acre project located south of east Woodward Drive will include 800 age-restricted homes, and a 30,000 clubhouse

(originally built as a mansion). The clubhouse would be surrounded by softball fields, tennis courts and bocce courts.

12. Oakwood Trails Project: The approximately 207-acre project located west of McKinley Avenue and north of Woodward Avenue will include 20.02 acres of General Commercial, 11.59 acres of Business Industrial Park, 15.67 acres of Park/Basin areas, and 676 Low Density Residential lots.
13. Griffin Park Master Plan Project: The project would include annexation of 333.94 acres of land into the Manteca city limits, and the subsequent development of 1,592 units and approximately 35,340 square feet of neighborhood service commercial uses.

CUMULATIVE EFFECTS OF THE PROJECT

Cumulative settings are identified under each cumulative impact analysis. Cumulative settings vary because the area that the impact may affect is different. For example, noise impacts generally only impact the local surrounding area because noise travels a relatively short distance while air quality impacts affect the whole air basin as wind currents control air flow and are not generally affected by natural or manmade barriers which would affect noise. Cumulative Project impacts are addressed and summarized below.

Method of Analysis

Although the environmental effects of an individual project may not be significant when that project is considered separately, the combined effects of several projects may be significant when considered collectively. State CEQA Guidelines 15130 requires a reasonable analysis of a project's cumulative impacts, which are defined as "two or more individual effects which, when considered together are considerable or which compound or increase other environmental impacts." The cumulative impact that results from several closely related projects is: the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonable foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time (State CEQA Guidelines 15355[b]). Cumulative impact analysis may be less detailed than the analysis of the project's individual effects (State CEQA Guidelines 15130[b]).

There are two approaches to identifying cumulative projects and the associated impacts. The list approach identifies individual projects known to be occurring or proposed in the surrounding area in order to identify potential cumulative impacts. The projection approach uses a summary of projections in adopted General Plans or related planning documents to identify potential cumulative impacts. This EIR uses a combination of the list approach and the projection approach for the cumulative analysis and considers the development anticipated to occur upon buildout of the various General Plans in the area in addition to the pending and proposed projects in the area.

Project Assumptions

The proposed Project's contribution to environmental impacts under cumulative conditions is based on full buildout of the Project site. See Chapter 2, Project Description, for a complete description of the proposed Project.

Cumulative Impacts

Some cumulative impacts for issue areas are not quantifiable and are therefore discussed in general terms as they pertain to development patterns in the surrounding region. Exceptions to this are traffic, utilities, noise and air quality (the latter two of which are associated with traffic volumes), which may be quantified by estimating future traffic patterns, pollutant emitters, etc. and determining the combined effects that may result. In consideration of the cumulative scenario described above, the proposed Project may result in the following cumulative impacts.

AESTHETICS

The cumulative setting for aesthetics is the City of Manteca and surrounding areas of Lathrop and San Joaquin County.

Impact 4.1: Cumulative Damage to Scenic Resources within a State Scenic Highway (Less than Significant and Less than Cumulatively Considerable)

There are no designated State Scenic Highways in the vicinity of the Project site. Only one highway section in San Joaquin County is listed as a Designated Scenic Highway by the Caltrans Scenic Highway Mapping System; the segment of State Route 580 from Interstate 5 to State Route 205. This route traverses the edge of the Coast Range to the west and Central Valley to the east. The City of Manteca and the Project site are not visible from this roadway segment. Additionally, there are no "eligible" highway segments in the vicinity of the Project site that may be included in the State Scenic Highway system. Cumulative development in the city would not impact a Designated Scenic Highway. Implementation of the proposed Project would have a **less than significant** cumulative impact relative to this environmental topic. As such, impacts relative to scenic resources would be a **less than cumulatively considerable contribution** and no mitigation is required.

Impact 4.2: Cumulative Degradation of the Existing Visual Character of the Region (Cumulatively Considerable and Significant and Unavoidable)

As described in Section 3.1, Aesthetics, implementation of the proposed Project would convert the Project site from its existing agricultural character to a developed commercial and residential area with various buildings, landscaping, parks, and parking areas. Project implementation would alter the existing visual character of the Project site. Implementation of the proposed development standards and consistency with the General Plan and the Manteca Zoning Ordinance would ensure that impacts are reduced to the greatest extent possible. Nevertheless, impacts related to degradation of the visual character of the site would be significant and unavoidable.

Under cumulative conditions, buildout of the General Plan for Manteca and the surrounding jurisdictions could result in changes to the visual character and quality of the City of Manteca through development of undeveloped areas and/or changes to the character of existing communities. Development of the proposed Project, in addition to other future projects in the area, would change the existing visual and scenic qualities of the City. There are no mitigation measures that could reduce this impact except a ceasing of all future development, which is not a feasible option. As such, this is a **cumulatively considerable contribution** and **a significant and unavoidable** impact.

Impact 4.3: Cumulative Impact on Light and Glare (Less than Significant and Less than Cumulatively Considerable)

Implementation of the lighting plan required by Mitigation Measure 3.1-1 would ensure that lighting features do not result in light spillage onto adjacent properties and do not significantly impact views of the night sky. Adherence to the City's Municipal Code would ensure that excessively reflective building materials are not used, and that the proposed Project would not result in significant impacts related to daytime glare. Future projects within Manteca, Lathrop, and San Joaquin County would be subject to the light and glare standards established by the individual jurisdictions. These regulations are designed to minimize potential light and glare impacts of new development. Implementation of these regulations would ensure that future projects minimize their potential light and glare impacts resulting in a **less than significant** cumulative impact relative to this environmental topic. As such, impacts related to nighttime lighting and daytime glare would be a **less than cumulatively considerable contribution**, and no mitigation is required.

AGRICULTURAL RESOURCES

The cumulative setting for agriculture and forest resources is all of San Joaquin County. According to the Department of Conservation, the County had 748,629 acres of farmland in 2014, the majority of which is identified as Prime Farmland. Of the total farmland, Prime Farmland represents 51 percent (382,877 acres), Farmland of Statewide importance represents 11 percent (82,160 acres), and Unique Farmland represents 10 percent (72,053 acres).

Impact 4.4: Cumulative Impact on Agricultural Resources (Cumulatively Considerable and Significant and Unavoidable)

As described in Section 3.2, development of the proposed Project would result in a conversion of 248.225 acres of Farmland of Statewide Importance as shown on the map prepared under the Farmland Mapping and Monitoring Program (FMMP), to nonagricultural uses. The loss of Important Farmland as classified under the FMMP is considered a potentially significant environmental impact.

The City's agricultural mitigation fee program requires that future development pay the agricultural mitigation fee, currently $2,584.51 per acre, to mitigate the conversion of agricultural land to urban use. The City will use these funds to purchase conservation easements or deed restrictions on agricultural land to ensure that the land remains in agricultural use in perpetuity.

In addition to the City's agricultural mitigation fee program, the SJMSCP requires development to pay fees on a per-acre basis for impacts to agricultural lands that function as habitat for biological resources. SJCOG will then use these funds to purchase the conservation easements on agricultural and habitat lands in the Project vicinity. The compensation results in the purchase of conservation easements that are placed over agricultural land, such as alfalfa and row crops. As such, the Project fees paid to SJCOG as administrator of the SJMSCP will result in the preservation of agricultural lands in perpetuity.

The purchase of conservation easements and/or deed restrictions through the City agricultural mitigation fee program and the SJMSCP allows the landowners to retain ownership of the land and continue agricultural operations, and preserves such lands in perpetuity.

While the proposed Project will contribute fees toward the purchase of conservation easements on agricultural lands through the City's agricultural mitigation fee program and the SJMSCP mitigation program, as required by Mitigation Measure 3.2-1, those fees and conservation easements would not result in the creation of new farmland to offset the loss that would occur with Project implementation. As such, the loss of Important Farmland would be a **cumulatively considerable contribution** and a **significant and unavoidable** impact.

AIR QUALITY

The cumulative setting for air quality impacts is the San Joaquin Valley Air Basin (SJVAB), which consists of eight counties, stretching from Kern County in the south to San Joaquin County in the north. The SJVAB is bounded by the Sierra Nevada in the east, the Coast Ranges in the west, and the Tehachapi mountains in the south.

Impact 4.5: Cumulative Impact on the Region's Air Quality (Cumulatively Considerable and Significant and Unavoidable)

Under buildout conditions in the San Joaquin County, the SJVAB would continue to experience increases in criteria pollutants and efforts to improve air quality throughout the basin would be hindered. As described in Section 3.3, San Joaquin County has a state designation of nonattainment for ozone, PM_{10}, and $PM_{2.5}$ and is either unclassified or attainment for all other criteria pollutants. The County has a national designation of nonattainment for ozone and $PM_{2.5}$. Table 3.3-2 in Section 3.3 presents the State and Federal attainment status for San Joaquin County.

As discussed under Impact 3.3-1 in Section 3.3, the proposed Project would result in increased emissions primarily from vehicle miles travelled associated with Project implementation. The SJVAPCD has established operations related emissions thresholds of significance and it was determined that annual emissions of ROG, NOx, and PM_{10} exceed the SJVAPCD thresholds of significance.

There are limited mitigation inputs available within the California Emission Estimator Model (CalEEMod)^{TM} (v.2016.3.1) to quantify emission reductions. As shown in Table 3.3-8, even with basic mitigation incorporated into the model, the proposed Project would exceed the SJVAPCD thresholds of significance for ROG, NOx, and PM_{10} during operation. In addition, as shown in Table

3.3-11, annual construction emissions of ROG, NO_x, PM_{10}, and $PM_{2.5}$ will not exceed the SJVAPCD thresholds of significance in any given year.

The proposed Project is subject to the SJVAPCD Rule 9510 (Indirect Source Rule [ISR]), which could result in substantial mitigation of emissions beyond what is reflected in the modeling outputs. The reductions are accomplished by the incorporation of mitigation measures into projects and/or by the payment of an Indirect Source Rule fee for any required reductions that have not been accomplished through Project mitigation commitments. The current fees are $9,350 per ton of NOx. The actual calculations will be determined and finalized by the SJVAPCD and Project applicants as individual projects are brought forward for approval under Rule 9510.

The substantial reductions in NO_x (and associated ROG) and PM_{10} emissions accomplished by the application of the ISR represent the best achievable mitigation for indirect sources. However, operational emissions levels would remain above the defined thresholds of significance. As such, implementation of the proposed Project would have a **cumulatively considerable contribution** and **significant and unavoidable** impact from air emissions.

BIOLOGICAL RESOURCES

The cumulative setting for biological resources includes the Project site and the greater San Joaquin County region. Development associated with implementation of the local General Plan(s) would contribute to the ongoing loss of natural and agricultural lands in San Joaquin County, including the Project site. Cumulative development would result in the conversion of existing habitat to urban uses. The local General Plan(s), in addition to regional, State and federal regulations, includes policies and measures that mitigate impacts to biological resources associated with General Plan buildout. Additionally, local land use authorities in San Joaquin County require development to participate in the SJMSCP, which is a habitat conservation plan and natural community conservation plan for San Joaquin County that provides a mechanism for compensatory mitigation for habitat and species loss in accordance with federal and State laws.

Impact 4.6: Cumulative Loss of Biological Resources Including Habitats and Special Status Species (Less than Significant and Less than Cumulatively Considerable)

Under cumulative conditions, buildout of the General Plan(s) within San Joaquin County will result in impacts to biological resources in the cumulative area through new and existing development. The General Plan(s) includes policies that are designed to minimize impacts to the extent feasible and the SJMSCP has been established to provide a mechanism for compensatory mitigation and standardized avoidance and minimization measures as needed.

As described in Section 3.4 Biological Resources, no special-status invertebrates, reptiles, amphibians, birds, mammals, or plants were observed within the Project site during field surveys. Mitigation Measure 3.4-1 requires participation with the SJMSCP, which includes fees that will be used to purchase conservation lands for a variety of special status species. The SJMSCP was created and adopted to address both the Project and cumulative impacts to biological resources, including special status species. The proposed Project will participate in the SJMSCP, including

payment of fees and implementation of all Incidental Take Minimization Measures required by the SJCOG through the authorization of SJMSCP coverage.

Additionally, there is an irrigation basin/ditch located within the portion of the Project that was part of the Oakwood Trails Project. The irrigation basin is a man-made ditch that functions to drain upland agricultural runoff. A wetland delineation and permit applications have been submitted to the USACE (404), CDFW (1600), and RWQCB (401) to request authorization for fill through the Oakwood Trails Project (see wetland delineation in Appendix F). The wetland delineation refers to the portion of the ditch that is within the proposed Project boundary as Irrigation Ditch #4. This ditch is 0.24 acres and is approximately 712.2 feet long. The Project applicant must consult with the USACE to ensure that the regulatory agency authorizes the proposed fill activities of Irrigation Ditch #4. There are no other wetlands that are proposed for disturbance. Mitigation Measure 3.4-2 requires the Project applicant to obtain authorization for fill from the regulatory agencies (USACE-404 permit, RWQCB-401 certification, 1600 Streambed Alteration Agreement).

The ongoing operational phase of the proposed Project requires discharge of stormwater into the City storm drainage system, which ultimately discharges into the Delta. The Manteca Municipal Code Title 13 (Public Services) Chapter 13.28 (Stormwater Management and Discharges) establish minimum storm water management requirements and controls. Storm water drainage is managed through the implementation of best management practices to the extent they are technologically achievable to prevent and reduce pollutants. The City requires reasonable protection from accidental discharge of prohibited materials or other wastes into the municipal storm drain system or watercourses. The management of water quality through BMPs is intended to ensure that water quality does not degrade to levels that would interfere or impede fish or wildlife.

Implementation of Mitigation Measures 3.4-1 and 3.4-2 in Section 3.4 would reduce potentially cumulative impacts to a **less than significant** level. As such, impacts to biological resources would be a **less than cumulatively considerable** contribution.

CULTURAL AND TRIBAL RESOURCES

The geography of cultural and tribal resources impact can be defined by region, by political subdivision or by the geography of the cultural resources present in an area, where sufficient inventory data is available to define it. The cumulative setting for cultural and tribal resources includes all of the San Joaquin County. There are extensive cultural sites located in the region.

Impact 4.7: Cumulative Impacts on Known and Undiscovered Cultural or Tribal Resources
(Less than Significant and Less than Cumulatively Considerable)

Cumulative development anticipated in the City of Manteca, including growth projected by adopted future projects, may result in the discovery and removal of cultural resources, including archaeological, paleontological, historical, and Native American resources and human remains. As discussed in Section 3.5, Cultural Resources, no prehistoric artifacts or evidence of prehistoric use of the survey area was found. No historic resources were recorded.

Any previously unknown cultural resources which may be discovered during development of the proposed Project would be required to be preserved, either through preservation in place, excavation, documentation, curation, data recovery, or other appropriate measures. With implementation of the mitigation measures provided in Section 3.5, the proposed Project is not anticipated to considerably contribute to a significant reduction in cultural resources in the region.

All future projects in the regional vicinity would be subject to their respective General Plans (i.e. City of Manteca, City of Lathrop, and San Joaquin County), each of which have policies and measures that are designed to ensure protection of undiscovered cultural resources. In addition, all discretionary projects in these jurisdictions would require environmental review per regulations established in CEQA.

Implementation of the proposed Project would have a **less than significant** cumulative impact relative to this environmental topic. As such, impacts related to cultural resources would result in a **less than cumulatively considerable contribution**.

GEOLOGY, SOILS, AND MINERAL RESOURCES

Impacts related to geology, soils, and mineral resources are not inherently cumulative. Geology and soils concerns are related to risks, hazards or development constraints that are largely site-specific. However, seismic hazards are regional, and management of seismic hazards is vested with the local planning and building authority. For this reason, the potential for cumulative geology, soils, and mineral resources impacts are considered in the context of the City of Manteca and vicinity.

Impact 4.8: Cumulative Impact on Geologic Resources, Soils Resources, and Mineral Resources (Less than Significant and Less than Cumulatively Considerable)

As discussed in Section 3.6, Geology, Soils, and Mineral Resources, implementation of the proposed Project has limited potential for liquefaction, liquefaction induced settlement, and lateral spreading. However, mitigation measures provided in Section 3.6 ensure this impact will be less than significant. While the City is not within an area known for its seismic activity, there will always be a potential for groundshaking caused by seismic activity anywhere in California, including the Project site. Seismic activity could come from a known active fault such as the Greenville fault, or any number of other faults in the region. In order to minimize potential damage to the buildings and site improvements, all construction in California is required to be designed in accordance with the latest seismic design standards of the California Building Code. Additionally, the City of Manteca has incorporated numerous policies relative to seismicity to ensure the health and safety of all people. Design in accordance with these standards and policies would reduce any potential impact to a less than significant level.

Additionally, the Project site is not located within a Mineral Resource Zone. No known natural gas fields were identified in the vicinity of the Project site (San Joaquin County, 1992).

Impacts related to geology, soils, and mineral resources tend to be site-specific and Project-specific. With the mitigation measures presented in Section 3.6, implementation of the proposed

Project would not result in increased risks or hazards related to geologic conditions in the cumulative setting area, nor would it result in any off-site or indirect impacts. Implementation of the proposed Project would have a **less than significant** cumulative impact relative to this environmental topic. As such, impacts related to geologic resources, soil resources, and mineral resources would result in a l**ess than cumulatively considerable contribution**.

GREENHOUSE GASES AND CLIMATE CHANGE

The cumulative setting for greenhouse gas emissions and climate change impacts for this analysis is San Joaquin County, which is the boundary for the California Air Resources Board's regional greenhouse gas emissions reduction targets.

Impact 4.9: Cumulative Impact on Climate Change from Increased Project-Related Greenhouse Gas Emissions (Cumulatively Considerable and Significant and Unavoidable)

Greenhouse gas emissions from a single Project will not cause global climate change; however, greenhouse gas emission from multiple projects throughout a region or state could result in a cumulative impact with respect to global climate change.

In California, there has been extensive legislation passed with the goal of reducing greenhouse gas emissions. The primary legislative goals are as follows: 1) achieve 2000 GHG levels by 2010, 2) achieve 1990 GHG levels by 2020 and 3) achieve 80% below the 1990 GHG levels by the year 2050. To achieve these goals, the California Air Resources Board has developed regional greenhouse gas emission reduction targets for the automobile and light truck sectors (the largest single source of greenhouse gas emissions) for 2020 and 2035. The regional greenhouse gas emission reduction targets for each region in California were established by the California Air Resources Board.

As described in Section 3.7, implementation of the proposed Project will still generate greenhouse gas emissions that wouldn't otherwise exist without the proposed Project. Given the length of construction activities for a Project of this size, the construction emissions would be a long-term release of approximately 6,686 MTCO2e. The operational emissions would be a long-term release totaling approximately 29,851 MTCO2e. The City of Manteca must weigh the economic and social benefits of development against the environmental impacts associated with development. The City of Manteca's planning efforts included targeted growth that accommodates the economic and social needs of the community, while recognizing and seeking to mitigate environmental impacts when growth occurs. The proposed Project has incorporated mitigation measures that are intended to reduce emissions to the extent feasible. The State continues to implement measures that are intended to reduce emissions on a State-wide scale (i.e., vehicle fuel efficiency standards in fleets, low carbon fuels, etc.) that are consistent with AB 32. These types of State-wide measures will benefit the proposed Project (and City as a whole) in the long-term as they come into effect; however, the City does not have the jurisdiction to create far reaching (i.e. State-wide) measures to reduce GHG emissions.

Additionally, as demonstrated above, the proposed Project would be generally consistent with the goals and strategies of the RTP/SCS and the Manteca Climate Action Plan. Mitigation Measure 3.7-

1 requires measures to reduce wasteful, inefficient, and unnecessary consumption of energy during the operational phase of the proposed Project, including exceedance of Title 24 by 15 percent. This measure would ensure compliance with Strategy ENG-1 of the Manteca Climate Action Plan. Additionally, the proposed Project would be located in an area that is currently served by the San Joaquin RTD. As required by Mitigation Measure 3.3-2, the Project would incorporate bus turnouts and transit improvements where requested by the San Joaquin RTD, continuous public sidewalks and/or multi-use trails adjacent to all proposed public streets, and paving and striping for bike lanes/paths. Furthermore, as required by Mitigation Measure 3.3-3, the Project is required to prepare and implement a TDM plan for the non-residential portion of the Project. The TDM plan is required to be coordinated with SCJOG's Commute Connection Program. Implementation of Mitigation Measures 3.3-2 and 3.3-3 in Section 3.3 would ensure compliance with Strategies POD-1, POD-2, and TDM-2 of the Manteca Climate Action Plan.

On a project-by-project case, the City of Manteca evaluates a project and the potential to impose project-specific mitigation, which has been done through the greenhouse gas analysis. However, because the Project would result in a net increase in CO_2e emissions even with mitigation measures incorporated into the Project, it would result in a **significant and unavoidable** and **cumulatively considerable** impact.

HAZARDS AND HAZARDOUS MATERIALS

The cumulative context for the analysis of cumulative hazards and human health impacts is San Joaquin County, including all cumulative growth therein, as represented by full implementation of each respective General Plan (i.e., Manteca, Lathrop, and San Joaquin County). As discussed in Section 3.8, Hazards and Hazardous Materials, implementation of the proposed Project would not result in any significant impacts related to this environmental topic with the implementation of the mitigation measures provided in Section 3.8.

Impact 4.10: Cumulative Impact Related to Hazards and Hazardous Materials (Less than Significant and Less than Cumulatively Considerable)

The proposed Project, in conjunction with cumulative development in the region, would include areas designated for a variety of urban, agricultural, and open space uses as defined by the applicable General Plan. Cumulative development would include continued operation of, or development of, new facilities as allowed under each land use designation. New development would inevitably increase the use of hazardous materials within the region, resulting in potential health and safety effects related to hazardous materials use. For the most part, potential impacts associated with new and future development would be confined to commercial and industrial areas and would not involve the use of hazardous substances in large quantities or that would be particularly hazardous. Incidents, if any, would typically be site specific and would involve accidental spills or inadvertent releases. Associated health and safety risks would generally be limited to those individuals using the materials or to persons in the immediate vicinity of the materials and would not combine with similar effects elsewhere (i.e., construction workers). Hazard-related impacts tend to be site-specific and Project-specific. The Project site is not

associated with any existing hazardous materials spills; however, there are numerous areas throughout the County where hazardous conditions are present.

Implementation of the proposed Project would not result in significant increased risks of hazards in the cumulative setting area, nor would it result in any significant off-site or indirect impacts. Mitigation measures have been included to reduce the risk of on-site hazards associated with the use of on-site hazardous materials. Implementation of the proposed Project would have a **less than significant** cumulative impact relative to this environmental topic. As such, impacts related to hazards and hazardous materials would result in a l**ess than cumulatively considerable contribution**.

HYDROLOGY AND WATER QUALITY

Potential cumulative issues associated with surface waters can be addressed on a watershed basis, or in the case of groundwater, in the context of a groundwater basin. Because water resources are highly interconnected, the cumulative setting is based on San Joaquin County which is located in the San Joaquin River Hydrological Region. Cumulative development in this region, including the proposed Project, would impact the water quality and hydrological features of the San Joaquin River Hydrologic Region. The City of Manteca and much of the surrounding area is located in the Eastern San Joaquin River Groundwater Basin. This groundwater basin covers approximately 1,105 square miles. The Project site is located in the Oakwood Lake - San Joaquin River watershed. Any matter that may affect water quality draining from the Project site will eventually end up in the Delta or within the groundwater basin.

Impact 4.11: Cumulative Increases in Peak Stormwater Runoff from the Project site (Less than Significant and Less than Cumulatively Considerable)

Implementation of the proposed Project would increase the amount of impervious surfaces in the Project site, which could increase peak stormwater runoff rates and volumes on and downstream on the Project site. However, the proposed Project includes an extensive system of on-site stormwater collection facilities to accommodate the increased stormwater flows that would originate in the Project site.

The Project site is located in Zone 39, and is not currently served by the SSJID. As a result, the 2013 SDMP identifies a conveyance and disposal system separate from SSJID facilities for this zone. For development in Zone 39, the 2013 SDMP identifies that separate facilities will be constructed to convey the runoff to one regional pump station that will discharge into Walthall Slough, which terminates into the San Joaquin River to the west. The discharge of stormwater must be treated through BMPs prior to its discharge. However, as an alternative to the construction of a separate facility in Zone 39 to convey the runoff to a regional pump station that will discharge into Walthall Slough, the City of Manteca and the SSJID are currently working on a plan that will include the SSJID annexation Zone 39 (including the Project site) into the SSJID Service District 4. Under this framework the Project site would convey water to the FCOC; and eventually to the San Joaquin River.

The proposed stormwater collection system functions by attenuating its runoff before pumping it into either the French Camp Outlet Canal, or into the Walthall Slough. The City will use real-time water level monitoring stations at critical low points in the conveyance system complete with SCADA (Supervisory Control and Data Acquisition) facilities to determine when stormwater can be pumped into the Outlet Canal and when it must be retained.

The exact sizing of the underground piping and basin will be engineered during the preparation of the improvement plans. High groundwater can impact the effectiveness of detention basins. To the extent that groundwater enters the basins, the storage available for the runoff is diminished. The bottom of the basins will be designed to maintain a minimum of five feet of separation from groundwater or other design measures will be implemented such as impervious liners with sub drain systems. Additionally, the proposed Project includes approximately 16.06 acres of park/basin areas and would maintain approximately 6.77 acres of open space, which will function in part as surge/detention basins, and as recreational amenities of the Project.

With the design and construction of flood control improvements, the proposed Project would not increase peak stormwater runoff. Implementation of the proposed Project would have a **less than significant** cumulative impact relative to this environmental topic. As such, impacts related to stormwater runoff would result in a l**ess than cumulatively considerable contribution**.

Impact 4.12: Cumulative Impacts Related to Degradation of Water Quality (Less than Significant and Less than Cumulatively Considerable)

The proposed Project, along with several of the related projects within the City of Manteca, would ultimately discharge stormwater runoff to the nearby Delta waterways. This would potentially degrade the water quality of the system.

Construction of the proposed Project would contribute to a cumulative increase in urban pollutant loading, which could adversely affect water quality. Cumulative development in the Manteca area, including the proposed Project, would also result in increased impervious surfaces that could increase the rate and amount of runoff, thereby potentially adversely affecting existing surface water quality through increased erosion and sedimentation. The primary sources of water pollution include: runoff from roadways and parking lots; runoff from landscaping areas; non-stormwater connections to the drainage system; accidental spills; and illegal dumping. Runoff from roadway and parking lots could contain oil, grease, and heavy metals; additionally, runoff from landscaped areas could contain elevated concentrations of nutrients, fertilizers, and pesticides.

The proposed Project will be required to comply with Mitigation Measure 3.9-1 which requires the development and approval of a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP will include Best Management Practices (BMPs) to regulate stormwater quality for the Project site which will be designed in accordance with the City of Manteca's National Pollutant Discharge Elimination System Permit (NPDES) issued by the RWQCB.

While there are no assurances that other projects in the County would incorporate the same degree or methods of treatment as the proposed Project, several of the projects within the City of Manteca would phase out existing agricultural runoff discharges from their respective sites and,

similar to the proposed Project, could provide some level of water quality improvement. Also, each related Project that would discharge stormwater runoff would be required to comply with NPDES discharge permits from the RWQCB, which adjusts requirements on a case-by-case basis to avoid significant degradation of water quality. Therefore, while a greater quantity of urban runoff may be discharged to the Delta system with implementation of the related projects, because of an increase in impervious surfaces, the associated surface water quality impacts would be expected to be less than significant because of improved or similar quality of runoff compared to existing conditions.

Compliance with City and County water quality protection regulations, approval from the RWQCB, and Mitigation Measure 3.9-1 would ensure that the proposed Project minimizes impacts to surface water quality. Implementation of the proposed Project would have a **less than significant** cumulative impact relative to this environmental topic. As such, impacts related to water quality would result in a l**ess than cumulatively considerable contribution**.

Impact 4.13: Cumulative Impacts Related to Degradation of Groundwater Supply or Recharge (Less than Significant and Less than Cumulatively Considerable)

The proposed Project would result in new impervious surfaces and could reduce rainwater infiltration and groundwater recharge. Infiltration rates vary depending on the overlying soil types. In general, sandy soils have higher infiltration rates and can contribute to significant amounts of ground water recharge; clay soils tend to have lower percolation potential; and impervious surfaces such as pavement significantly reduce infiltration capacity and increase surface water runoff.

The Project site has soils with a hydrologic rating of “A”, which is indicative of soils having a high infiltration rate (low runoff potential) when thoroughly wet. The arents soils have a hydrologic rating of “C”, which is indicative of soils having a low infiltration rate (high runoff potential). The infiltration rate of the soils on the Project site is considered high on the majority of the Project site. Development of the proposed Project site with impervious surfaces could reduce rainwater infiltration and groundwater recharge further. The park areas totaling approximately 16.06 acres will remain largely pervious. Additionally, approximately 6.77 acres of open space would be maintained as part of the Project. The collection of rainwater for those areas of impervious surfaces will be routed into the proposed Project’s storm drainage system and eventually flow into the San Joaquin River. The exact design of the drainage basin in not known at this time, therefore, it is not known whether the drainage basin will percolate or not (i.e. unlined or lined).

The Project site is located in the Eastern San Joaquin County Groundwater Basin. The basin is not adjudicated; however, a basin management plan has been created. The Eastern San Joaquin Groundwater Basin Groundwater Management Plan (ESJGB-GMP) (NSJCGB, 2004) was prepared in September 2004. The purpose of the ESJGB-GMP is “to review, enhance, assess, and coordinate existing groundwater management policies and programs in Eastern San Joaquin County and to develop new policies and programs to ensure the long-term sustainability of groundwater resources in Eastern San Joaquin County.” According to Department of Water Resources (DWR) Bulletin 118 (DWR, 2006), the ESJGB is in a critical condition of overdraft. Groundwater levels have

declined in the basin since the 1960s with the lowest groundwater levels found in eastern San Joaquin County.

Groundwater pumping in Manteca increased from 2,277 AFY in 1960 to a maximum of 14,933 AFY in 2004 prior to the SCWSP delivering treated surface water to the City. According to the City's 2005 UWMP, the sustainable yield of the groundwater basin was estimated in a 1985 study to be approximately 1 acre-foot per acre per year. Although groundwater pumping in some years has exceeded that rate, as part of the SCWSP, the City intends to limit groundwater pumping to that rate or less. At this time, the area of the City's PUSA is 13,790 acres. Therefore, the City intends to limit groundwater pumping to a long-term average of no greater than 13,790 afy.

Much of the groundwater recharge in the basin occurs in the sand and gravels along the San Joaquin River from Sierra snowmelt flowing downstream. Precipitation in the region is 13.81 inches, most of which falls between November through April. A portion of this annual rainfall infiltrates the soil and groundwater basin, while a portion is discharged downstream into the Delta. While the proposed Project would reduce the amount of pervious surfaces within the Project site, it will retain at approximately 9 percent of the site as a pervious surface.

For the reasons mentioned above, the proposed Project would not cause the substantial depletion of groundwater supplies or interfere substantially with groundwater recharge. Implementation of the proposed Project would have a **less than significant** and **less than cumulatively considerable** impact relative to this topic.

Impact 4.14: Cumulative Impacts Related to Flooding (Less than Significant and Less than Cumulatively Considerable)

The southernmost portion of the Project site is within the 100-year flood zone as delineated by FEMA. The remainder of the Project site is not located within the 100-year flood zone. The southernmost portion of the Project site would be preserved as open space as part of the Project and, as such, housing or structures would not be located within the 100-year flood zone.

While the majority of the Project site is not within the 100-year flood hazard area, the entire Project site does lie within the 200-year flood hazard area. Because the Project site is located within the 200-year flood zone, Subsection C of Section 17.30.040 of the Manteca Municipal Code applies to the Project:

> *The review authority shall not approve the execution of a development agreement, a tentative map, or a parcel map for which a tentative map is not required, or a discretionary permit or other discretionary entitlement that would result in the construction of a new building, or construction that would result in an increase in allowed occupancy for an existing building, or issuance of a ministerial permit that would result in the construction of a new residence for property that is located within the F-200 Zone unless the review authority finds, based on substantial evidence in the record, one of the following:*

1. *The facilities of the State Plan of Flood Control or other flood management facilities protect the property to the urban level of flood protection in urban and urbanizing areas;*

2. *The City has imposed conditions on a development agreement, map, permit, or entitlement that will protect the property to the urban level of flood protection in urban and urbanizing areas;*

3. *The local flood management agency has made adequate progress (as defined in California Government Code Section 65007) on the construction of a flood protection system that will result in flood protection equal to or greater than the urban level of flood protection in urban or urbanizing areas; or*

4. *The property is located in an area of potential flooding of three feet or less from a storm event that has a one in two hundred chance of occurring in any given year, from sources other than local drainage, in urban and urbanizing areas.*

The facilities of the State Plan of Flood Control or other flood management facilities do not currently protect the Project site. Through Mitigation Measure 3.9-3, the City has imposed a condition that will protect the Project site to the urban level of flood protection. As discussed above, the City of Manteca has made adequate progress (as defined in California Government Code Section 65007) on the construction of a flood protection system that will result in flood protection equal to or greater than the urban level of flood protection in urban or urbanizing areas. The Project site is located in an area of potential flooding of five feet or greater from a storm event that has a one in two hundred chance of occurring in any given year, from sources other than local drainage, in urban and urbanizing areas.

The City of Manteca will continue planning efforts to provide adequate funding for necessary improvements, pursuant to the SB 5 requirements. The City will then be required to design and construct the necessary improvements. Until the improvements are in place, the Project would not be constructed because the Project site is above the three-foot flood depth. With implementation of the mitigation measures included in Section 3.9 of this Draft EIR, the proposed Project would have a **less than significant** cumulative impact relative to this environmental topic. Implementation of the proposed Project would have a **less than significant** and **less than cumulatively considerable** impact relative to this topic.

LAND USE, POPULATION, AND HOUSING

The cumulative setting for land use and population impacts is the City of Manteca.

Impact 4.15: Cumulative Impact on Communities and Local Land Uses (Less than Significant and Less than Cumulatively Considerable)

Cumulative land use impacts, such as the potential for conflicts with adjacent land uses and consistency with adopted plans and regulations, are typically site- and Project-specific. Prior to

Project authorization, City approval of the proposed Project would require approval of a General Plan amendment to change land uses on the Project site. Changes to the Land Use Element would include changing approximately 121.67 acres of BIP to LDR uses; changing approximately 70.0 acres of UR-BIP to LDR uses; changing approximately 9.39 acres of UR-VLDR to LDR uses; changing approximately 23.41 acres of CMU to LDR uses; changing approximately 11.59 acres of BIP to HDR uses; maintaining approximately 13.0 acres as GC; and maintaining approximately 6.77 acres of OS. The current and proposed General Plan land uses are shown in Section 2.0, Figures 2.0-6 and 2.0-9, respectively.

The Project is located within the City of Manteca city limits and will provide for housing opportunities, and employment-generating uses that will promote employment and economic development, and a mix of land uses, while providing an attractive, sustainable neighborhood. The Project is consistent with the General Plan land use policies that encourage an orderly pattern of development that is contiguous with the City boundary, require growth to contribute to a diversified economic base and balance between employment and housing opportunities, and allowing for recreation uses.

The land uses as proposed are not consistent with the General Plan. When land uses are not consistent with a General Plan there are two courses of action: 1) the uses are not allowed due to the inconsistency, or 2) the land uses are changed through an amendment to the General Plan to create consistency. The proposed Project includes a General Plan amendment to change land uses on the northeast portion of the Project site. As noted above, changes to the Land Use Element would include changing approximately 121.67 acres of BIP to LDR uses; changing approximately 70.0 acres of UR-BIP to LDR uses; changing approximately 9.39 acres of UR-VLDR to LDR uses; changing approximately 23.41 acres of CMU to LDR uses; changing approximately 11.59 acres of BIP to HDR uses; maintaining approximately 13.0 acres as GC; and maintaining approximately 6.77 acres of OS. Approval of the General Plan amendment would ensure that the proposed Project would be substantially consistent with the Manteca General Plan land use requirements and would have a **less than significant** and **less than cumulatively considerable** impact relative to the Manteca General Plan. It is noted that consistency with Manteca General Plan policies and programs related to environmental topics other than land use (aesthetics, biological resources, cultural resources, geology/soils, hazards, hydrology/water quality, noise, public services, transportation, and utilities) are discussed in the relevant sections of this EIR.

The Manteca Zoning Code implements the General Plan. The proposed Project includes a rezone of the Project site in coordination with the proposed General Plan land use designation changes discussed above. Changes to the Zoning Map would include changing approximately 79.39 acres of Undesignated (UND) to One-Family Dwelling Zoning District (R-1) uses; changing approximately 121.67 acres of Business Industrial Park (BIP) to R-1 uses; changing approximately 23.41 acres of Commercial Mixed Use (CMU) to R-1 uses; approximately 11.59 acres of BIP to Multiple-Family Dwelling Zoning District (R-3) uses; maintaining approximately 13.0 acres as General Commercial (CG); and maintaining approximately 6.77 acres of Open Space (OS). These proposed zone changes would ensure that zoning would be consistent with the proposed General Plan designations within

the Project site. The zoning ordinance establishes permitted uses, development densities and intensities, and development standards for each zone to ensure that public health, safety, and general welfare are protected, consistent with the purpose of the Zoning Code. All existing City development standards and zoning requirements for the proposed zoning are applicable to any activities on the Project site.

The City will review each component of the proposed Project as plans (improvement plans, building plans, site plans, etc.) are submitted for final approval to ensure that they are consistent with the City's Zoning ordinance. Approval of the zone change would ensure that the proposed Project would be consistent with the Zoning Code and will have a **less than significant** and **less than cumulatively considerable** relative to this topic.

Impact 4.16: Cumulative Impacts on Population and Housing (Less than Significant and Less than Cumulatively Considerable)

As described in Section 3.10, the proposed Project would add residential housing structures in the Project site, and would directly increase the population of the City. There is one barn structure located on the Project site. However, the barn appears abandoned and likely does not house any residents. Development of the Project would remove the onsite barn, and would add 1,265 residential units. Therefore, the Project would not displace substantial numbers of people or existing housing.

The Housing Element of the Manteca General Plan identifies that the City has capacity for 4,922 residential units on vacant and underdeveloped sites. The proposed Project would result in direct population growth beyond the what was planned for the Project site in the General Plan, but not beyond the City's capacity. The proposed Project would eliminate the CMU and BIP uses assumed under the General Plan from the Project site. This would significantly decrease the employment opportunities assumed for the Project site under the General Plan; thus, the indirect population growth resulting from the proposed 13.0-acre general commercial area would be significantly less than the planned uses for the Project site anticipated under the General Plan. Therefore, the proposed Project is not anticipated to exceed the planned growth in the area beyond what is anticipated in the City of Manteca General Plan.

While the proposed Project will result in growth, it is not anticipated to significantly induce growth beyond the levels analyzed in the City's General Plan and Housing Element, or displace substantial numbers of housing or people. Implementation of the proposed Project would have a **less than significant** cumulative impact relative to this environmental topic. As such, impacts related to population and housing would result in a l**ess than cumulatively considerable contribution**.

NOISE

The cumulative setting for noise impacts consists of the existing and future noise sources that could affect the Project site or surrounding uses.

Impact 4.17: Cumulative Exposure of Existing and Future Noise-Sensitive Land Uses to Increased Noise Resulting from Cumulative Development
(Less than Significant and Less than Cumulatively Considerable)

The cumulative context for noise impacts associated with the proposed Project consists of the existing and future noise sources that could affect the Project or surrounding uses. Noise generated by construction would be temporary, and would not add to the permanent noise environment or be considered as part of the cumulative context. The total noise impact of the proposed Project would be fairly small and would not be a substantial increase to the existing future noise environment. Thus, the proposed Project would result in a less-than-significant cumulative impact.

Traffic: Cumulative noise impacts would occur primarily as a result of increased traffic on local roadways due to the proposed Project and on-site activities resulting from operation of the proposed Project. Table 3.11-7 in Section 3.11, Noise, shows cumulative traffic noise levels with and without the proposed Project. As discussed in Section 3.11, the Project would not result in significant increases in traffic noise levels at existing sensitive receptors. New residential uses will be constructed to comply with the applicable City of Manteca exterior and interior noise level standards.

Construction Noise: Noise generated by construction would be temporary, and would not add to the permanent noise environment or be considered as part of the cumulative context. Implementation of the proposed Project would have a **less than significant** cumulative impact relative to this environmental topic. As such, impacts related to construction noise would result a l**ess than cumulatively considerable contribution**.

Cumulative Conclusion: The traffic noise from the proposed Project is not expected to produce noise levels that would exceed City standards. Increased Project related traffic would increase traffic noise levels by less than the City's 10 dB increase criteria outlined in the Thresholds of Significance section, at existing sensitive receptors. Consequently, the total noise impact of the proposed Project would not be a substantial increase to the future noise environment. The proposed Project would result in a **less-than-significant cumulative impact**.

PUBLIC SERVICES AND RECREATION

Cumulative setting would include all areas covered in the service areas of the City of Manteca Fire Department, Police Department, Parks and Recreation Department, the Manteca Unified School District, and any other relevant public services.

Impact 4.18: Cumulative Impact on Public Services
(Less than Significant and Less than Cumulatively Considerable)

Implementation of the proposed Project would contribute toward an increased demand for public services and facilities within the City of Manteca. It has been determined that the impacts to the Manteca Police, Manteca Fire, and Parks and Recreation Departments would be less-than-significant. Additionally, it has been determined that the impacts to the Manteca Unified School District would be less-than-significant. The proposed Project would be subject to all fees that are paid toward the enhancement of public services within the region. Payment of the applicable impact fees by the Project applicant, and ongoing revenues that would come from property taxes, sales taxes, and other revenues generated by the proposed Project, would assist in maintaining existing fire, police, schools, and park services. Implementation of the proposed Project would have a **less than significant** cumulative impact relative to this environmental topic. As such, impacts related to public services would result in a l**ess than cumulatively considerable contribution**.

TRANSPORTATION AND CIRCULATION

A Cumulative Conditions analysis was performed to identify potential impacts of the proposed Project under Cumulative (Year 2040) AM and PM peak hour conditions. Local roadway and regional freeway improvements, corresponding Travel Demand Model Forecasts, and intersection and regional freeway segment operations analysis results are presented in Section 3.13 on pages 3.13-30 through 3.13-48 and impacts 3.13-10 through 3.13-25.

Impact 4.19: Under Cumulative conditions, the proposed Project would impact the Yosemite Avenue / McKinley Avenue intersection. (Less than Significant and Less than Cumulatively Considerable)

The Project would cause an impact to the Yosemite Avenue / McKinley Avenue intersection, which is an all-way stop controlled intersection within the City of Lathrop. The Yosemite Avenue / McKinley Avenue intersection is projected to operate at LOS F with 55 seconds of delay during the PM peak hour. The addition of project traffic would exacerbate LOS F conditions and increase intersection delay to 56 seconds. The increase in intersection delay is less than five seconds as defined by the significance criteria for the City of Lathrop. Therefore, this impact is **less than significant** and **less than cumulatively considerable**.

Impact 4.20: Under Cumulative conditions, the proposed Project would impact the McKinley Avenue / Woodward Avenue intersection. (Significant and Unavoidable and Cumulatively Considerable in the Short-Term, Less Than Significant and Less than Cumulatively Considerable in the Long-Term)

The Project would cause significant impacts to the McKinley Avenue / Woodward Avenue intersection, which is an all-way stop controlled intersection within the City of Manteca. The McKinley Avenue / Woodward Avenue intersection is projected to operate at LOS E with 47 seconds of delay during the PM peak hour. The addition of Project traffic would exacerbate

intersection operations by more than three seconds during the PM peak hour, resulting in LOS F and 60 seconds of delay.

This study intersection is under City of Manteca jurisdiction. The following measures have been identified in the City's PFIP to improve intersection operations from LOS F to LOS D conditions:

- Signalized the intersection; and
- Construct left-turn pockets on all approaches.

The City of Manteca would be responsible for the intersection improvement, acquisition of right-of-way, and construction; therefore, based on the significance criteria, this impact is considered **significant and unavoidable** and **cumulatively considerable** in the short-term until the planned improvements are complete. The Project applicant would be required to pay their fair share fee towards the intersection improvements, as required by Mitigation Measure 3.13-8. It is noted that this impact would be reduced to **less than significant** and **less than cumulatively considerable** once these improvements are in place.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-8.***

Impact 4.21: Under Cumulative conditions, the proposed Project would result in a significant impact at the Daniels Street / Airport Way intersection. (Significant and Unavoidable and Cumulatively Considerable in the Short-Term, Less Than Significant and Less than Cumulatively Considerable in the Long-Term)

The Project would cause significant impacts to the Daniels Street / Airport Way intersection, which is signalized and within the City of Manteca. The Daniels Street / Airport Way intersection is projected to operate at LOS F with 102 seconds of delay during the PM peak hour. The addition of Project traffic would exacerbate the intersection's operations to LOS F with 110 seconds of delay.

This study intersection is under City of Manteca jurisdiction. The following measures have been identified in the City's PFIP to improve intersection operations from LOS F to LOS D conditions:

- Re-stripe the existing eastbound through lane to provide a shared through/right lane; and
- Construct a third southbound through lane.

The City of Manteca would be responsible for the intersection improvement, acquisition of right-of-way, and construction; therefore, based on the significance criteria, this impact is considered **significant and unavoidable** and **cumulatively considerable** in the short-term until the planned improvements are complete. The Project applicant would be required to pay their fair share fee towards the intersection improvements, as required by Mitigation Measure 3.13-9. It is noted that this impact would be reduced to **less than significant** and **less than cumulatively considerable** once these improvements are in place.

MITIGATION MEASURE(S)

Implement ***Mitigation Measure 3.13-9.***

Impact 4.22: Under Cumulative conditions, Project implementation would exacerbate unacceptable levels of service at the SR 120 / Airport Way interchange. (Significant and Unavoidable and Cumulatively Considerable in the Short-Term, Less Than Significant and Less than Cumulatively Considerable in the Long-Term)

The signalized SR 120 / Airport Way ramp-terminal intersections are projected to operate at unacceptable LOS F conditions during the PM peak hour under Cumulative No Project. The addition of Project traffic would exacerbate unacceptable operations at these intersections.

This study intersection is included in the City's PFIP. The following measures have been identified in the City of Manteca PFIP to provide acceptable operations under Cumulative conditions:

- Relocate the westbound ramp-terminal intersection approximately 180 feet south of its current location to create a tight interchange configuration, which will increase the spacing to the Airport Way/Daniels Street intersection;
- Construct loop on-ramps;
- Widen overcrossing to include two northbound and three southbound lanes; and
- Widen SR 120 eastbound and westbound off-ramps to include two left-turn lanes and two right-turn lanes.

The above measures are regional or city-wide improvements and are programed as such. The proposed Project would pay the appropriate regional traffic impact fees as a contribution toward these improvements. The SR 120 WB Ramps / Airport Way intersection would operate at LOS C during both the AM and PM peak hours. The SR 120 EB Ramps/Airport Way intersection would operate at LOS A during the AM peak hour and LOS C during the PM peak hour.

These measures are within the jurisdiction of Caltrans and beyond the control of the City of Manteca to implement without Caltrans approval. Additionally, funding for the remaining share of the total cost of the interchange improvements has not been secured. If Caltrans does not approve the proposed improvements and/or full funding is not secured, then the intersections would continue to operate at an unacceptable LOS, and the Project's contribution to this impact would be considered a significant impact. Therefore, based on the significance criteria, this impact is considered **significant and unavoidable** and **cumulatively considerable** in the short-term until the planned improvements are complete. The Project applicant would be required to pay their fair share fee towards the intersection improvement, as required by Mitigation Measure 3.13-9. It is noted that this impact would be reduced to **less than significant** and **less than cumulatively considerable** once these improvements are in place.

MITIGATION MEASURE(S)

Implement ***Mitigation Measure 3.13-9.***

Impact 4.23: Under Cumulative conditions, the proposed Project would result in a significant impact at the Atherton Drive / Airport Way intersection. (Significant and Unavoidable and Cumulatively Considerable in the Short-Term, Less Than Significant and Less than Cumulatively Considerable in the Long-Term)

The Project would cause significant impacts to the Atherton Drive / Airport Way intersection, which is a side street stop controlled intersection in the City of Manteca. The Atherton Drive / Airport Way intersection is projected to operate at LOS F under Cumulative AM and PM peak hour conditions. The addition of Project traffic would exacerbate the LOS F conditions during both peak hours.

This study intersection is under City of Manteca jurisdiction and the following measures, identified in the City's PFIP, would improve intersection operations from LOS F to LOS C and LOS B during the AM and PM peak hours, respectively:

- Signalize the intersection;
- Construct a second northbound through lane; and
- Construct a second southbound through lane.

The City of Manteca would be responsible for the intersection improvement, acquisition of right-of-way, and construction; therefore, based on the significance criteria, this impact is considered **significant and unavoidable** and **cumulatively considerable** in the short-term until the planned improvements are complete. The Project applicant would be required to pay their fair share fee towards the intersection improvements, as required by Mitigation Measure 3.13-1. It is noted that this impact would be reduced to **less than significant** and **less than cumulatively considerable** once these improvements are in place.

MITIGATION MEASURE(S)

Implement ***Mitigation Measure 3.13-1.***

Impact 4.24: Under Cumulative conditions, the proposed Project would result in a significant impact at the Airport Way / Woodward Avenue intersection. (Significant and Unavoidable and Cumulatively Considerable in the Short-Term, Less Than Significant and Less than Cumulatively Considerable in the Long-Term)

The Project would cause a significant impact to the Airport Way / Woodward Avenue intersection, which is an all-way stop controlled intersection in the City of Manteca. The Airport Way / Woodward Avenue intersection is projected to operate at LOS C and LOS E under Cumulative AM

and PM peak hours, respectively. The addition of Project traffic would exacerbate operations during both peak hours to LOS F conditions.

This study intersection is under City of Manteca jurisdiction and the following measures, which have been identified in the City's PFIP, would improve intersection operations from LOS F to LOS C and LOS D during the AM and PM peak hours, respectively:

- Signalize the intersection;
- Construct southbound left-turn and right-turn pockets; and
- Construct a northbound left-turn pocket.

The City of Manteca would be responsible for the intersection improvement, acquisition of right-of-way, and construction; therefore, based on the significance criteria this impact is considered **significant and unavoidable** and **cumulatively considerable** in the short-term until the planned improvements are complete. The Project applicant would be required to pay their fair share fee towards the intersection improvements, as required by Mitigation Measure 3.13-2. It is noted that this impact would be reduced to **less than significant** and **less than cumulatively considerable** once these improvements are in place.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-2.***

Impact 4.25: Under Cumulative conditions, Project implementation would exacerbate cumulatively unacceptable LOS at the SR 120 / Union Road interchange. (Significant and Unavoidable and Cumulatively Considerable in the Short-Term, Less Than Significant and Less than Cumulatively Considerable in the Long-Term)

The signalized SR 120 / Union Road ramp-terminal intersections are projected to operate at unacceptable LOS E or LOS F conditions during both peak hours under Cumulative No Project. The addition of Project traffic would exacerbate unacceptable operations at these intersections by more than three seconds

As noted previously, a detailed study and design of the Union Road / SR 120 interchange is currently underway. With implementation of the interchange project's partial cloverleaf alternative, the Union Road ramp terminal intersections would operate at LOS A under Cumulative Plus Project conditions. The Project applicant would be required to pay their fair share fee towards the improvement, as required by Mitigation Measure 3.13-11. Calculations for this analysis are in Appendix 3.13-9. The Union Road ramp terminal intersections would also operate acceptably under Cumulative Plus Project conditions with the construction of a Diverging Diamond Interchange (DDI). However, Caltrans would be responsible for the intersection improvement; therefore, based on the significance criteria, this impact is considered **significant and unavoidable** and **cumulatively considerable** in the short-term until the planned improvements are completed,

and **less than significant** and **less than cumulatively considerable** once the improvements are in place.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-11.***

Impact 4.26: Under Cumulative conditions, the proposed Project would result in an impact at the McKinley Avenue / Atherton Drive intersection. (Significant and Unavoidable and Cumulatively Considerable in the Short-Term, Less Than Significant and Less than Cumulatively Considerable in the Long-Term)

The signalized McKinley Avenue / Atherton Drive intersection is projected to operate at acceptable LOS C conditions during both peak hours under Cumulative No Project. The addition of Project traffic would result in unacceptable LOS F during the PM peak hour.

The McKinley Avenue / Atherton Drive intersection is included in the City of Manteca's PFIP. In addition to contributing towards the construction of the McKinley Avenue / Atherton Drive intersection, the following measure has been identified in to improve intersection operations from LOS F to LOS D during the PM peak hour:

- Optimize signal timings.

The City of Manteca would be responsible for the intersection improvement; therefore, based on the significance criteria, this impact is considered **significant and unavoidable** and **cumulatively considerable** in the short-term until the planned improvements are complete. The Project applicant would be required to pay their fair share fee towards the intersection improvement, as required by Mitigation Measure 3.13-12. It is noted that this impact would be reduced to **less than significant** and **less than cumulatively considerable** once the improvement is in place.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-12.***

Impact 4.27: Under Cumulative conditions, the proposed Project would result in a significant impact at the Atherton Drive / Multi-Family Driveway intersection. (Less than Significant and Less than Cumulatively Considerable with Mitigation)

The Project would cause significant impacts to the Atherton Drive / Multi-Family Driveway intersection, which is an all-way stop controlled intersection in the City of Manteca. The Atherton Drive / Airport Way intersection is projected to operate at LOS E and LOS F under Cumulative AM and PM peak hour conditions, respectively. The addition of Project traffic would exacerbate the LOS E conditions during the AM peak hour by more than three seconds.

The following measure has been identified to improve intersection operations from LOS E and LOS F to LOS B and LOS D during the AM and PM peak hours, respectively:

- Signalize the intersection.

The Project applicant would be responsible for the above intersection improvement. Construction of the aforementioned improvement would result in an acceptable delay at the Atherton Drive / Multi-Family Driveway intersection. Therefore, based on the significance criteria and with implementation of Mitigation Measure 3.13-13, this impact is considered **less than significant** and **less than cumulatively considerable**.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-13.***

Impact 4.28: Under Cumulative conditions, the proposed Project would result in a significant impact at the Atherton Drive / Commercial Driveway intersection. (Less than Significant and Less than Cumulatively Considerable with Mitigation)

The Project would cause significant impacts to the Atherton Drive / Commercial Driveway intersection, which is a side-street stop controlled intersection in the City of Manteca. The addition of Project-generated traffic to the Atherton Drive / Dutch Harbor Way / Commercial Driveway intersection would cause the intersection to operate at LOS F with 383 seconds of delay during the PM peak hour.

This study intersection is under City of Manteca jurisdiction. The following measures have been identified to improve intersection operations from unacceptable LOS F with 383 seconds of delay to acceptable LOS B with 19 seconds of delay during the PM peak hour:

- Signalize the intersection;
- Construct an eastbound left-turn lane; and
- Construct a southbound left-turn lane in addition to a shared through/right lane.

The Project applicant would be responsible for the intersection improvement, acquisition of right-of-way, and construction. Construction of the aforementioned improvements would result in an acceptable delay at the Atherton Drive / Commercial Driveway intersection. Therefore, based on the significance criteria and with implementation of Mitigation Measure 3.13-4, this impact is considered **less than significant** and **less than cumulatively considerable**.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-4.***

Impact 4.29: Under Cumulative conditions, the proposed Project would result in an impact at the McKinley Avenue / Denali Drive intersection. (Significant and Unavoidable and Cumulatively Considerable in the Short-Term, Less Than Significant and Less than Cumulatively Considerable in the Long-Term)

The Project would cause significant impacts to the McKinley Avenue / Denali Drive intersection, which is a stop controlled intersection within the City of Manteca. The intersection would operate at unacceptable LOS F conditions during the PM peak hour.

This study intersection is included in the City's PFIP. The following measure has been identified in the City of Manteca PFIP to improve intersection operations from LOS F to LOS D during the PM peak hour:

- Construct a second northbound through lane.

The City of Manteca would be responsible for the intersection improvement, acquisition of right-of-way, and construction; therefore, based on the significance criteria, this impact is considered **significant and unavoidable** and **cumulatively considerable** in the short-term until the planned improvements are complete. The Project applicant would be required to pay their fair share fee towards the intersection improvements, as required by Mitigation Measure 3.13-14. It is noted that this impact would be reduced to **less than significant** and **less than cumulatively considerable** once these improvements are in place.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-14.***

Impact 4.30: Under Cumulative conditions, the proposed Project would result in an impact at the SR 120 / McKinley Avenue interchange. (Significant and Unavoidable and Cumulatively Considerable in the Short-Term, Less Than Significant and Less than Cumulatively Considerable in the Long-Term)

The signalized SR 120/McKinley Avenue ramp-terminal intersections are projected to operate at acceptable LOS A conditions during both peak hours under Cumulative No Project. The addition of Project traffic would result in acceptable LOS B or better during both peak hours. Table 3.13-17 shows the intersection delay and LOS during the Cumulative Plus Project condition, with mitigation.

A new interchange on SR 120 at McKinley Avenue is undergoing design by the City of Manteca and Caltrans District 10. The new SR 120 / McKinley Avenue interchange is included as a Tier 1 (Funded) project in the adopted 2014-2040 SJCOG 2014 RTP/SCS with an open to traffic date of 2021. This impact is considered **significant and unavoidable** and **cumulatively considerable** in the short-term until the planned improvements are completed. The Project applicant would be required to pay their fair share fee towards the intersection improvement, as required by

Mitigation Measure 3.13-5. It is noted that this impact would be reduced to **less than significant** and **less than cumulatively considerable** once these improvements are in place.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-5.***

Impact 4.31: Under Cumulative conditions, the proposed Project would result in a significant impact to freeway facilities. (Significant and Unavoidable, and Cumulatively Considerable)

The addition of Project-generated traffic would exacerbate unacceptable (i.e., LOS E) peak hour operations on the following freeway facilities:

- Eastbound SR 120 mainline from Yosemite Avenue to McKinley Avenue (PM peak hour);
- Eastbound SR 120 off-ramp at McKinley Avenue (PM peak hour);
- Eastbound SR 120 slip on-ramp at McKinley Avenue (PM peak hour);
- Eastbound SR 120 mainline from McKinley Avenue to Airport Way (PM peak hour);
- Eastbound SR 120 off-ramp at Airport Way (PM peak hour);
- Eastbound SR 120 on-ramp at Airport Way (PM peak hour);
- Eastbound SR 120 mainline from Airport Way to Union Road (PM peak hour);
- Eastbound SR 120 off-ramp at Union Road (AM and PM peak hours);
- Eastbound SR 120 on-ramp at Union Road (PM peak hour);
- Westbound SR 120 off-ramp at Union Road (AM and PM peak hours);
- Westbound SR 120 on-ramp at Union Road (AM and PM peak hours);
- Westbound SR 120 mainline from Union Road to Airport Way (AM and PM peak hours);
- Westbound SR 120 off-ramp at Airport Way (AM and PM peak hours);
- Westbound SR 120 off-ramp at McKinley Avenue (AM and PM peak hours);
- Westbound SR 120 loop on-ramp at McKinley Avenue (AM peak hour);
- Westbound SR 120 slip on-ramp at McKinley Avenue (AM peak hour); and
- Westbound SR 120 mainline from McKinley Avenue to Yosemite Avenue (AM and PM peak hours).

Project traffic would cause in excess of a 100 vehicle-per-day increase on the impacted SR 120 mainline or in excess of a one percent increase in on-ramp or off-ramp volumes at these locations. This impact is **significant and unavoidable** and **cumulatively considerable**.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-5.***

Impact 4.32: Under Cumulative conditions, the proposed Project would adversely affect pedestrian and bicycle facilities. (Less than Significant and Less than Cumulatively Considerable with Mitigation)

The Project would provide sidewalks and bicycle lanes in conjunction with the design of the vehicular circulation to offer a safe, aesthetic, and preferred alternative to reliance on the automobile. The Project, however, does not specify the location of planned bicycle and pedestrian facilities. The Project should ensure consistency with the *City of Manteca Bicycle Master Plan* (2003), which specifies that a Class I bicycle path is planned along Atherton Drive through the Project study area and along McKinley Avenue north of Atherton Drive. Because the Project description does not describe any planned bicycle facilities, the Project could create an inconsistency with policies related to bicycle systems. Mitigation Measure 3.13-6 would ensure consistency with the applicable plans. Consequently, with implementation of mitigation, this impact would be **less than significant** and **less than cumulatively considerable**.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-6.***

Impact 4.33: Under Cumulative conditions, the proposed Project would adversely affect transit services or facilities. (Less than Significant and Less than Cumulatively Considerable with Mitigation)

The proposed Project includes 975 single-family residential dwelling units, 290 multi-family residential dwelling units, and over 200,000 square feet of commercial space that could potentially increase transit ridership on Manteca Transit Bus Routes 1, 2, and 3. This increase in transit ridership would potentially impact a stop on Daniels Street, located approximately two miles from the Project site. A typical walkshed to access transit facilities is ½ mile. Therefore, because the nearest bus stop is greater than the typical walkshed to access transit facilities, this impact is considered potentially significant. It is noted that the Project, however, would not disrupt or interfere with existing or planned public transit services or facilities.

Mitigation Measure 3.13-7 would require consistency with policies concerning transit systems set forth in the Manteca Transit Short Range Transit Plan (2014), the SCJOG RTP/SCS, and the City of Manteca General Plan. Therefore, with implementation of the following mitigation, this impact would be **less than significant** and **less than cumulatively considerable**.

MITIGATION MEASURE(S)

*Implement **Mitigation Measure 3.13-7.***

Impact 4.34: Under Cumulative conditions, the proposed Project could cause potentially significant impacts to at-grade rail crossings. (Less than Significant and Less than Cumulatively Considerable)

Yosemite Avenue and McKinley Avenue each feature at-grade crossings of a UPRR railroad track. The Project would add about 200 AM peak hour trips and 600 PM peak hour trips to the McKinley Avenue crossing and about 20 AM peak hour trips and 40 PM peak hour trips to the Yosemite Avenue crossing. Each crossing has advanced warning signs, railroad crossing pavement markings, stop lines, crossing gates, flashing lights, and warning bells. Additionally, the Project would not add traffic to an at-grade crossing with a known safety problem. Therefore, this impact would be **less than significant** and **less than cumulatively considerable**.

UTILITIES

The cumulative setting includes all areas covered in the service areas of the City's wastewater system, water system, stormwater system, and the solid waste collection and disposal services. Under General Plan buildout conditions, the City would see an increased demand for water service, sewer service, solid waste disposal services, and stormwater infrastructure needs.

Impact 4.35: Cumulative Impact on Wastewater Utilities (Less than Significant and Less than Cumulatively Considerable)

The City of Manteca owns and operates a wastewater collection, treatment, and disposal system, and provides sewerage service to the City of Manteca and the City of Lathrop. On April 17, 2015, the RWQCB adopted Waste Discharge Requirements Order No. R5-2015-0026 NPDES NO. CA0081558, prescribing waste discharge requirements for the City of Manteca Wastewater Quality Control Facility (WQCF) and allowing expansion of the plant up to 17.5 mgd.

The City of Manteca's wastewater treatment system is currently in compliance with the WDR requirements of Order No. R5-2015-0026 NPDES NO. CA0081558. The wastewater treatment system options covered under this Order include: City of Manteca Wastewater Quality Control Facility (WQCF) including the collection system, basin/disposal fields, discharge to the San Joaquin River, and recycling conveyance and irrigation system. The development of the proposed Project would not exceed the wastewater discharge requirements in this Order as described under Impact 3.14-1 in Section 3.14. Implementation of the proposed Project would have a **less than significant** and **less than cumulatively considerable** impact relative to this topic.

The wastewater collection and conveyance system that will serve the proposed Project would consist of engineered infrastructure consistent with the City's existing infrastructure requirements. Sizing of existing infrastructure in the City varies based on location, but generally includes gravity sewers and force mains ranging in size from 8 to 24 inches, and pump stations. The existing facilities have undergone environmental review and have waste discharge permits from the State.

New wastewater collection and conveyance infrastructure needed for the proposed Project would require trenching/excavation of earth, and placement of pipe within the trenches at specific

locations, elevations, and gradients. All onsite water utility improvements would be within existing agricultural lands, the impacts of which are discussed in Section 3.2, Agricultural Resources. Implementation of the proposed Project would have a **less than significant** and **less than cumulatively considerable** impact relative to this topic.

According to the City's 2012 Wastewater Collection System Master Plan Update, Low Density Residential uses are estimated to generated 1,338 gallons per acre per day. The Project site includes 226.93 acres of Low Density Residential. Using this rate, the proposed Low Density Residential uses would generate 303,632 gallons per day (gpd) of wastewater. High Density Residential uses are estimated to generate 3,789 gallons per acre per day. The Project site includes 11.59 acres of High Density Residential. Using this rate, the proposed High Density Residential uses would generate 43,915 gpd of wastewater. General Commercial areas are estimated to generate 750 gallons per acre per day. The Project site includes 13.0 acres of General Commercial. Using this rate, the proposed General Commercial uses would generate 9,750 gpd of wastewater.

The total wastewater generated by the proposed Project is estimated to be 357,297 gpd. The proposed Project would increase the amount of wastewater requiring treatment. The wastewater would be treated at the WQCF. Occupancy of the proposed Project would be prohibited without sewer allocation. An issuance of sewer allocation from the City's available capacity would ensure that there would not be a determination by the wastewater treatment and/or collection provider that there is inadequate capacity to serve the proposed Project's projected demand in addition to the provider's existing commitments. Additionally, any planned expansion to the WQCF with a subsequent allocation of capacity to the proposed Project would ensure that there would not be a determination by the wastewater treatment and/or collection provider that there is inadequate capacity to serve the proposed Project's projected demand in addition to the provider's existing commitments.

While the Project by itself does not exceed the existing capacity of the wastewater treatment plant, the proposed Project in combination with future projects under buildout conditions would likely result in a deficit of capacity warranting improvements to increase treatment capacity. The City will have future flows totaling 19.5 mgd as of the General Plan horizon of 2023 with a buildout capacity of 23.0 mgd. Each Project that receives wastewater collection and treatment services is required to pay a connection fee, which serves as a Project share of service expansion. Implementation of the proposed Project would have a **less than significant** and **less than cumulatively considerable** impact relative to this topic.

Impact 4.36: Cumulative Impact on Water Utilities (Less than Significant and Less than Cumulatively Considerable)

The proposed Project would require extension of offsite water infrastructure to the Project site for potable water and irrigation water. Any offsite water utility improvements will be in or adjacent to existing roadways, thereby limiting any potential impact to areas that were not already disturbed. Construction of the offsite potable water infrastructure would not have the potential to indirectly induce growth beyond the direct population growth that would result from Project approval, given

that extension of water infrastructure utilities would not provide water service to an area outside of the Project site that is not currently served.

The proposed Project would require the construction of new onsite water infrastructure for potable water and irrigation water. All onsite water utility improvements will be within existing agricultural lands, the impacts of which are discussed in Section 3.2 Agricultural Resources. Construction of the onsite potable water infrastructure would not result in the extension of water utilities to an area of the City not currently served by water utilities, and as such, would not have the potential to indirectly induce population growth.

The proposed Project would not require the construction of new water treatment facilities or expansion of existing water treatment facilities for water service. The City has adequate water supplies to support existing demand in the City in addition to the proposed Project under average daily and maximum daily demand conditions. Water demand for current and proposed uses in the City of Manteca is 21,560AFY. The City has a total supply of 27,219 AFY, leaving 5,659 AFY available. The proposed Project's demand would be 762 AFY.

The Water Supply Assessment completed for the proposed Project demonstrates that the City's existing and available potable water supplies are sufficient to meet the City's existing and projected future potable water demands to the year 2035 under all hydrologic conditions. Implementation of the proposed Project would have a **less than significant** and **less than cumulatively considerable** impact relative to this topic.

Impact 4.37: Cumulative Impact on Stormwater Facilities (Less than Significant and Less than Cumulatively Considerable)

The proposed Project includes storm drainage improvements. Onsite storm drainage would be installed to serve the proposed Project. As shown in Figure 2.0-11, development of the proposed Project would include construction of a new storm drainage system, including a drainage collection system, and detention basins. All on-site storm drainage runoff will be collected through drain inlets in the landscaped areas and catch basins along the streets and within properties, and conveyed via surface swales and underground trunk lines to the detention and water quality basins. The storm water drainage detention basins will be constructed to meet the City of Manteca Standards. Discharge from the basins will be conveyed through controlled flow pumping facilities to existing City of Manteca and SSJID dual use main storm drain laterals. Discharge from the basins will be conveyed through controlled flow pumping facilities to existing City of Manteca and SSJID dual use main storm drain laterals.

Final engineering of the storm drainage system will be accomplished through the improvement plan preparation of each phase. Storm drainage infrastructure to serve the proposed Project will include an underground piped drainage system, detention park basins, and pumps as needed. The drainage systems would provide for short-term storm water detention, storm water conveyance for storm waters. The design of such infrastructure considers the drainage volume that flows through the drainage from the entire watershed to ensure that there isn't flooding. Implementation of the

proposed Project would have a **less than significant** and **less than cumulatively considerable** impact relative to this topic.

Impact 4.38: Cumulative Impact on Solid Waste Facilities
(Less than Significant and Less than Cumulatively Considerable)

Solid waste generated in the City is disposed at the Forward Landfill. This landfill is projected to close in the year 2020. At that time the City can utilize the Foothill Landfill as a location for solid waste disposal. The permitted maximum disposal at the Forward Landfill is 8,668 tons per day. The total permitted capacity of the landfill is 51.04 million cubic yards, which is expected to accommodate an operational life until January 1, 2020. The remaining capacity is 23,700,000 cubic yards. After the projected closure of the Foothill Landfill in 2020, solid waste generated in Manteca would be sent to the Foothill Landfill. The Foothill Landfill has a remaining capacity of 97,900,000 cubic yards and a projected closure date of 2054.

The General Commercial area is estimated to generate roughly five pounds per day per 1,000 square feet. It is estimated that the 237,838 square feet of commercial space would generate 1,189 pounds per day of solid waste. Note, this estimate of the square footage for the commercial space is considered a worst-case scenario and may very well prove to be an overestimate.

The Residential portion of the Project site is estimated to generate roughly 10 pounds per day per household. For the proposed Project, site 1,265 residential units are proposed. It is estimated that the 1,265 residential units would generate 12,650 pounds per day of solid waste.

The total solid waste generated by the proposed project is estimated to be 6.92 tons per day. The proposed Project would be required to comply with applicable state and local requirements including those pertaining to solid waste, construction waste diversion, and recycling. The addition of the volume of solid waste associated with the proposed Project, approximately 6.92 tons per day at total buildout, to the Forward Landfill would not exceed the landfill's remaining capacity through 2020. After the projected closure of the Foothill Landfill in 2020, solid waste generated in Manteca would be sent to the Foothill Landfill. The Foothill Landfill has a capacity of 97,900,000 cubic yards and a projected closure date of 2054, which is adequate to serve the City and the Project site under cumulative conditions. As such, implementation of the proposed Project would have a **less than significant** cumulative impact relative to this environmental topic. Thus, impacts related to solid waste facilities would be a l**ess than cumulatively considerable contribution**.

4.2 SIGNIFICANT IRREVERSIBLE EFFECTS

LEGAL CONSIDERATIONS

CEQA Section 15126.2(c) and Public Resources Code Sections 21100(b)(2) and 21100.1(a), require that the EIR include a discussion of significant irreversible environmental changes which would be involved in the proposed action should it be implemented. Irreversible environmental effects are described as:

- The project would involve a large commitment of nonrenewable resources;

- The primary and secondary impacts of a project would generally commit future generations to similar uses (e.g., a highway provides access to previously remote area);
- The project involves uses in which irreversible damage could result from any potential environmental accidents associated with the project; or
- The phasing of the proposed consumption of resources is not justified (e.g., the project involves the wasteful use of energy).

Determining whether the proposed Project would result in significant irreversible effects requires a determination of whether key resources would be degraded or destroyed such that there would be little possibility of restoring them. Irretrievable commitments of resources should be evaluated to assure that such current consumption is justified.

Analysis

Implementation of the proposed Project would result in the conversion of 258.29 acres of land currently used for agricultural and rural residential uses for the development of residential and commercial uses. Development of the proposed Project would constitute a long-term commitment to these uses. It is unlikely that circumstances would arise that would justify the return of the land to its original condition as agricultural or vacant rural land.

A variety of resources, including land, energy, water, construction materials, and human resources would be irretrievably committed for the initial construction, infrastructure installation and connection to existing utilities, and its continued maintenance. Construction of the proposed Project would require the commitment of a variety of other non-renewable or slowly renewable natural resources such as lumber and other forest products, sand and gravel, asphalt, petrochemicals, and metals.

Additionally, a variety of resources would be committed to the ongoing operation and life of the proposed Project. The introduction of residential and commercial uses to the Project site will result in an increase in area traffic over existing conditions. Fossil fuels are the principal source of energy and the proposed Project will increase consumption of available supplies, including gasoline and diesel. These energy resource demands relate to initial Project construction, Project operation and site maintenance and the transport of people and goods to and from the Project site.

4.4 SIGNIFICANT AND UNAVOIDABLE IMPACTS

CEQA Guidelines Section 15126.2(b) requires an EIR to discuss unavoidable significant environmental effects, including those that can be mitigated but not reduced to a level of insignificance. The following significant and unavoidable impacts of the proposed Project are discussed in Chapters 3.1 through 3.14 and previously in this chapter (cumulative-level). Refer to those discussions for further details and analysis of the significant and unavoidable impact identified below:

- Impact 3.1-1: Project implementation may result in substantial adverse effects on scenic vistas and resources or substantial degradation of visual character.
- Impact 3.2-1: The proposed Project has the potential to result in the conversion of Farmlands, including Prime Farmland and Farmland of Statewide Importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural uses.
- Impact 3.3-1: Project operation has the potential to cause a violation of an air quality standard or contribute substantially to an existing or projected air quality violation.
- Impact 3.7-1: Potential to generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment or potential to conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.
- Impact 3.13-1: The proposed Project would result in a significant impact at the Yosemite Avenue / McKinley Avenue intersection.
- Impact 3.13-2: The proposed Project would result in a significant impact at the Atherton Drive / Airport Way intersection.
- Impact 3.13-3: The proposed Project would result in a significant impact at the Woodward Avenue / Airport Way intersection.
- Impact 3.13-6: The proposed Project would result in a significant impact to freeway facilities.
- Impact 3.13-11: Under Cumulative conditions, the proposed Project would impact the McKinley Avenue / Woodward Avenue intersection.
- Impact 3.13-12: Under Cumulative conditions, the proposed Project would result in a significant impact at the Daniels Street / Airport Way intersection.
- Impact 3.13-13: Under Cumulative conditions, Project implementation would exacerbate unacceptable levels of service at the SR 120 / Airport Way interchange.
- Impact 3.13-14: Under Cumulative conditions, the proposed Project would result in a significant impact at the Atherton Drive / Airport Way intersection.
- Impact 3.13-15: Under Cumulative conditions, the proposed Project would result in a significant impact at the Airport Way / Woodward Avenue intersection.
- Impact 3.13-16: Under Cumulative conditions, Project implementation would exacerbate cumulatively unacceptable LOS at the SR 120 / Union Road interchange.
- Impact 3.13-17: Under Cumulative conditions the proposed Project would result in an impact at the McKinley Avenue / Atherton Drive intersection.
- Impact 3.13-20: Under Cumulative conditions, the proposed Project would result in an impact at the McKinley Avenue / Denali Drive intersection.
- Impact 3.13-21: Under Cumulative conditions, the proposed Project would result in an impact at the SR 120 / McKinley Avenue interchange.
- Impact 3.13-22: Under Cumulative conditions, the proposed Project would result in a significant impact to freeway facilities.

5.1 CEQA REQUIREMENTS

CEQA requires that an EIR analyze a reasonable range of feasible alternatives that meet most or all project objectives while reducing or avoiding one or more significant environmental effects of the project. The range of alternatives required in an EIR is governed by a "rule of reason" that requires an EIR to set forth only those alternatives necessary to permit a reasoned choice (CEQA Guidelines Section 15126.6[f]). Where a potential alternative was examined but not chosen as one of the range of alternatives, the CEQA Guidelines require that the EIR briefly discuss the reasons the alternative was dismissed.

PROJECT OBJECTIVES

The principal objective of the proposed Project is the approval and subsequent implementation of the Oakwood Landing – Cerri & Denali Subdivisions Project (the proposed Project). The quantifiable objectives of the proposed Project include development of the 258.29-acre Project site, which will include: Low Density Residential, High Density Residential, General Commercial, and Open Space.

The Oakwood Landing – Cerri & Denali Subdivisions Project identifies the following objectives:

- Establish a mixed use project with residential, commercial, and public facilities that collectively provide for local and regional housing and employment opportunities and that take advantage of the area's high level of accessibility.
- Low Density Residential: Provide residential housing opportunities that are visually attractive and accommodate the future housing demand in Manteca.
- General Commercial: Establish a core of regional and local serving business and commercial uses that capitalize upon the visibility and access provided by State Route 120.
- Public Facilities: Provide infrastructure and park space that meets City standards, is integrated with existing and planned facilities and connections, and increases recreation opportunities for existing and future residents of the City.
- Phasing: Establishes a logical phasing plan designed to ensure that each phase of development would include necessary public improvements required to meet City standards.

ALTERNATIVES NOT SELECTED FOR FURTHER ANALYSIS

A Notice of Preparation was circulated to the public to solicit recommendations for a reasonable range of alternatives to the proposed Project. Additionally, a public scoping meeting was held during the public review period to solicit recommendations for a reasonable range of alternatives to the proposed Project. No specific alternatives were recommended by commenting agencies or the general public during the NOP public review process.

5.0 ALTERNATIVES TO THE PROPOSED PROJECT

The City of Manteca considered alternative locations early in the public scoping process. The City's key considerations in identifying an alternative location were as follows:

- Is there an alternative location where significant effects of the Project would be avoided or substantially lessened?
- Is there a site available within the City's Sphere of Influence with the appropriate size and characteristics such that it would meet the basic Project objectives?

The City's consideration of alternative locations for the Project included a review of previous land use planning and environmental documents in Manteca including the General Plan. The search included a review of lands in the south part of Manteca that is located within the Sphere of Influence and is otherwise suitable for development. It was found that there are numerous approved projects and proposed projects that are currently under review in South Manteca. These approved and proposed projects are not available for acquisition by the Project applicant, and are not considered a feasible alternative for the Project applicant. The City has found that there are no feasible alternative locations that exist within the City's Sphere of Influence with the appropriate size and characteristics that would meet the basic Project objectives and avoid or substantially lessen a significant effect. The City has determined that alternative locations outside the Sphere of Influence would not be feasible because an expansion of the Sphere of Influence would induce unplanned growth and cause impacts greater than development on the Project site. For these reasons, the City of Manteca determined that there are no feasible alternative locations.

In addition, as discussed in *Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553 (Goleta II), where a project is consistent with an approved general plan, no off-site alternative need be analyzed in the EIR. The EIR "is not ordinarily an occasion for the reconsideration or overhaul of fundamental land-use policy." (Goleta II, supra, 52 Cal.3d at p. 573.) In approving a general plan, the local agency has already identified and analyzed suitable alternative sites for particular types of development and has selected a feasible land use plan. "Informed and enlightened regional planning does not demand a project EIR dedicated to defining alternative sites without regard to feasibility. Such ad hoc reconsideration of basic planning policy is not only unnecessary, but would be in contravention of the legislative goal of long-term, comprehensive planning." (Goleta II, supra, 52 Cal.3d at pp. 572-573.) Here, the proposed Project is generally consistent with the types of uses considered in the Manteca General Plan and associated EIR, and thus, in addition to the reasons discussed above, an off-site alternative need not be further discussed in this EIR.

5.2 ALTERNATIVES CONSIDERED IN THIS EIR

Three alternatives to the proposed Project were developed based on input from City staff and the technical analysis performed to identify the environmental effects of the proposed Project. The alternatives analyzed in this EIR include the following three alternatives in addition to the proposed Project.

- **No Project (No Build) Alternative**: Under this alternative, development of the project site would not occur, and the project site would remain in its current existing condition.
- **Increased Density Alternative:** Under this alternative, the proposed project would be developed with the same amenities as described in the Project Description, but the density of the residential uses would be increased.
- **Agriculture Protection Alternative:** Under this alternative, the proposed project would be developed in such a way to protect those lands currently identified as prime farmland and farmland of statewide importance, by reducing the overall footprint of the developed areas to a greater extent than the reduced project alternative.

NO PROJECT (NO BUILD) ALTERNATIVE

Under the No Project (No Build) Alternative development of the Project site would not occur, and the Project site would remain in its current existing condition. It is noted that the No Project (No Build) Alternative would fail to meet the Project objectives identified by the City of Manteca.

INCREASED DENSITY ALTERNATIVE

Under this alternative, the proposed Project would be developed with the same components as described in the Project Description, but density of the residential uses would be increased. Under the Increased Density Alternative, the same number of residential units as the proposed Project (1,265 units) would be constructed. The residential areas would be clustered throughout the Project site at increased densities to allow for an increase in park/open space areas. Additionally, all of the residences would have equal lot sizes. The residential density under the Increased Density Alternative would fall within the allowed density for the City's Low Density Residential land use designation (2.1 to 8.0 dwelling units per acre [du/ac]). The 16.06-acres of park/open space uses would be increased to 32 acres. Additionally, the 13.0-acre commercial area would provide an estimated 237,838 square feet of neighborhood-serving commercial uses, identical to the proposed Project.

AGRICULTURE PROTECTION ALTERNATIVE

The reasoning behind this alternative is to present an alternative to protect some of the farmland on the Project site. Development of the proposed Project would result in the permanent conversion of roughly 248.225 acres of Farmland of Statewide Importance. Under this alternative, the proposed Project would be developed with the same components as

described in the Project Description, but the size of the buildings and residential areas would be reduced resulting in an increase of undeveloped land beyond the Increased Density Alternative. The 13.0-acre commercial area would be reduced from 237,838 square feet to 118,919 square feet. Residential units would be reduced from 1,265 to 636. The total acreage dedicated to proposed Project would be reduced by approximately 1/2. The total acreage developed would be 129.15 acres, with 129.14 acres remaining in its current state. The 129.14 acres that would remain undeveloped would include the agricultural land only.

5.3 ENVIRONMENTAL ANALYSIS

The alternatives analysis provides a summary of the relative impact level of significance associated with each alternative for each of the environmental issue areas analyzed in this EIR. Following the analysis of each alternative, Table 5.0-1 summarizes the comparative effects of each alternative.

NO PROJECT (NO BUILD) ALTERNATIVE

Aesthetics and Visual Resources

The No Project (No Build) Alternative would leave the Project site in its existing state and would not result in increases in daytime glare or nighttime lighting. The visual character of the Project site would not change under this alternative compared to existing conditions.

As described in Section 3.1, the visual character of the Project site would be significantly altered as a result of Project implementation. Implementation of the proposed development standards and consistency with the General Plan and the Manteca Zoning Ordinance would ensure that impacts are reduced to the greatest extent possible. Nevertheless, impacts related to degradation of the visual character of the site would be significant and unavoidable.

Implementation of the lighting plan required by Mitigation Measure 3.1-1 would ensure that lighting features do not result in light spillage onto adjacent properties and do not significantly impact views of the night sky. Adherence to the mitigation measure would ensure that excessively reflective building materials are not used, and that the proposed Project would not result in significant impacts related to daytime glare. As such, impacts related to nighttime lighting and daytime glare would be less than significant with mitigation.

The proposed Project would result in potentially significant new sources of light and glare. The proposed Project would also result in impacts to the existing visual character or quality of the Project site and its surroundings. However, the No Project (No Build) Alternative would avoid these impacts altogether. As such, this impact would be reduced when compared to the proposed Project.

Agricultural Resources

Currently, the majority of the Project site is used for agricultural purposes. The No Project (No Build) Alternative would result in no development in on the Project site. As such, this alternative

would have no impact on agricultural land, no potential for conflicts with existing agricultural resources, and no potential for conflict with regulations and plans intended to protect those resources. As such, this impact would be reduced when compared to the proposed Project.

Air Quality

Under buildout conditions in the San Joaquin County, the San Joaquin Valley Air Basin (SJVAB) would continue to experience increases in criteria pollutants and efforts to improve air quality throughout the basin would be hindered. As described in Section 3.3, San Joaquin County has a state designation of nonattainment for ozone (O_3), respirable particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$) and is either unclassified or attainment for all other criteria pollutants. The County has a national designation of nonattainment for $O_3$and $PM_{2.5}$. Table 3.3-2 in Section 3.3 presents the state and federal attainment status for San Joaquin County.

As discussed under Impact 3.3-1 in Section 3.3, the proposed Project would result in increased emissions primarily from vehicle miles travelled associated with Project implementation. The SJVAPCD has established operations related emissions thresholds of significance and it was determined that annual emissions of ROG, NOx, and PM_{10} exceed the SJVAPCD thresholds of significance.

Even with basic mitigation incorporated into the model, the proposed Project would exceed the SJVAPCD thresholds of significance for operational ROG, NOx, and PM_{10}. The proposed Project is subject to the SJVAPCD Rule 9510 (Indirect Source Rule), which could result in substantial mitigation of NOx and PM emissions. The reductions are accomplished by the incorporation of mitigation measures into projects and/or by the payment of an Indirect Source Rule fee for any required reductions that have not been accomplished through Project mitigation commitments. The current fees are $9,350 per ton of NOx. The actual calculations will be accomplished by the SJVAPCD and Project applicants as individual projects are brought forward for approval under Rule 9510.

Under the No Project (No Build) Alternative, the Project site would not be developed, and there would be no net change in emissions and no potential for a conflict with any adopted plans or policies related to air quality. As such, this impact would be reduced when compared to the proposed Project.

Biological Resources

As described in Section 3.4 Biological Resources, construction on the Project site has the potential to result in impacts to special-status species in the region. There are no known special-status species that have been observed on the Project site. Mitigation Measure 3.4-1 requires participation with the SJMSCP, which includes fees that will be used to purchase conservation lands for a variety of special status species. The SJMSCP was created and adopted to address both the Project and cumulative impacts to biological resources, including special status species. The proposed Project will participate in the SJMSCP, including payment of fees and implementation of all Incidental Take Minimization Measures required by the SJCOG through the authorization of SJMSCP coverage. Additionally, Mitigation Measure 3.4-2 requires the

Project applicant to obtain authorization for fill from the regulatory agencies (USACE-404 permit, RWQCB-401 certification, 1600 Streambed Alteration Agreement). Through the implementation of these mitigation measures found in Section 3.4, implementation of the proposed Project will have a less than significant impact on biological resources.

Under the No Project (No Build) Alternative, the proposed Project would not be constructed, no habitat would be removed, and no ground disturbing activities would occur. As such, this impact would be reduced when compared to the proposed Project.

Cultural and Tribal Resources

As described in Section 3.5, during the field surveys conducted on the Project site there were no historical, archaeological, or paleontological resources identified. However, as with most projects in the region that involve ground-disturbing activities, there is the potential for discovery of a previously unknown cultural and/or historical resource or human remains. Implementation of mitigation measures in Section 3.5 would reduce unknown cultural resources impacts to a less than significant level.

The No Project (No Build) Alternative would result in no ground disturbing activities related to the proposed Project and would not have the potential to disturb or destroy cultural, historic, and archaeological resources, as well as paleontological resources. While the proposed Project is not anticipated to result in significant impacts to cultural resources with mitigation, the No Project (No Build) Alternative would result in less potential for impacts to cultural resources as the entire Project site would continue to be used for agriculture production. As such, this impact would be reduced when compared to the proposed Project.

Geology, Soils, and Mineral Resources

The No Project (No Build) Alternative would result in the Project site remaining in its existing condition. There is one barn structure located on the Project site. However, the barn appears abandoned and likely does not house any residents. The No Project (No Build) Alternative would not involve new construction that could be subject to seismic, geologic or soils hazards, thus this alternative would have no potential for impact. As such, this impact would be reduced when compared to the proposed Project.

Greenhouse Gases and Climate Change

Short-term construction GHG emissions are a one-time release of GHGs and are not expected to significantly contribute to global climate change over the lifetime of the proposed Project. With mitigation measures, the overall annual GHG emissions associated with the proposed Project would be reduced by approximately 15.7 percent by the year 2020 compared to the business as usual scenario, which is inconsistent with applicable standards and thresholds of a 29 percent reduction. The proposed Project demonstrates that it has included feasible Best Performance Standards (BPS) that will collectively reduce GHG emissions by 15.7 percent. Nevertheless, the proposed Project will result in a net increase in emissions that will contribute to global climate change. While the 15.7 percent reduction is a reflection of the proposed Project's intent to

comply with the SJVAPCD's efforts to ensure that land development projects reduce GHG by incorporated BPSs, there will be an overall net increase in GHG emissions. Based on the criteria set forth in the SJVAPCD's Climate Change Action Plan, the proposed Project would have an individual and cumulative impact that is less than significant.

Under the No Project (No Build) Alternative, the Project site would not be developed, and there would be no net change in emissions and no potential for a conflict with any adopted plans or policies related to GHG reductions. As such, this impact would be reduced when compared to the proposed Project.

Hazards and Hazardous Materials

The proposed Project includes components which will likely use a variety of common household hazardous materials including: paints, cleaners, cleaning solvents, pesticides, fertilizers, and fuel. There will be a risk of release of these materials into the environment if they are not stored and handled in accordance with best management practices approved by San Joaquin County Department of Environmental Health.

Under the No Project (No Build) Alternative, no new land uses would be introduced to the Project site, and the potential for hazardous material release on the Project site would be eliminated. As such, this impact would be reduced when compared to the proposed Project.

Hydrology and Water Quality

As described in Section 3.9, implementation of the proposed Project has the potential to result in the violation of water quality standards and the discharge of pollutants into surface waters during both construction and long-term operations. Construction operations could result in temporary increases in runoff, erosion, sedimentation, soil compaction and wind erosion effects that could adversely affect soils and reduce the revegetation potential at construction sites and staging areas. The long-term operation of the proposed Project could result in long-term impacts to surface water quality from urban stormwater runoff and could enter groundwater or surface water systems. Additionally, the proposed Project would not significantly impact groundwater recharge. Although the Project site is located within a 200-year flood hazard area, Mitigation Measure 3.9-3 would ensure that this impact is less than significant. Mitigation measures provided in Section 3.9 reduce potential water quality and flooding impacts to a less than significant level.

Under the No Project (No Build) Alternative, potential water quality impacts from construction and operation of the proposed Project would be eliminated. While groundwater recharge is not considered a significant impact under the proposed Project, under this alternative, the land will be kept in its present state with the majority of the Project site being used for agricultural purposes. The majority of Project site has soils all have a hydrologic rating of "A", which is indicative of soils having a high infiltration rate (low runoff potential) when thoroughly wet. The arents soils have a hydrologic rating of "C", which is indicative of soils having a low infiltration rate (high runoff potential). The Project site is not a major source of groundwater recharge due to the lack of precipitation and the absence of a major water source. The No Project (No Build)

Alternative will have a greater chance of groundwater recharge because it does not introduce large areas of impervious surfaces as would the proposed Project. As such, potential impacts related to hydrology and water quality would be reduced under the No Project (No Build) Alternative when compared to the proposed Project.

Land Use, Population, and Housing

The proposed Project would result in direct population growth. The proposed Project would not result in indirect population growth beyond what was anticipated under the General Plan, or analyzed in detail in this EIR. The proposed Project would not displace any persons or housing units. The Project would require a zoning and general plan amendment for land use changes. However, impacts to land use are considered less than significant.

The No Project (No Build) Alternative would result in no changes to land use and would have no development. The proposed Project is not expected to induce substantial population increase that has not already been accounted for as a part of the approved General Plan, or analyzed in detail in this EIR. The proposed Project does not displace substantial numbers of persons or housing units. However, because the No Project (No Build) Alternative would not add any additional population and would not changes land use patterns, impacts related to land use and population would be reduced when compared to the proposed Project.

Noise

The proposed Project could increase noise-generating activities associated with the maintenance and operation of the proposed Project, as well as from vehicular traffic. The specific businesses that would occupy the Project site are not yet determined; therefore, an actual noise impact from commercial uses may or may not exist in the future. Mitigation measures provided in Section 3.11 would reduce all potential impact to a less than significant level. Under the No Project (No Build) Alternative, the Project site would not be developed and there would be no potential for new noise sources. As such, this impact would be reduced when compared to the proposed Project.

Public Services and Recreation

Under the No Project (No Build) Alternative, the Project site would remain undeveloped and there would be no increased demand for public services or recreation. The recreational amenities within the proposed Project, however, would not be developed for community use. The No Project (No Build) Alternative would have a reduced impact when compared to the proposed Project because demand on public services would be reduced with compared to the proposed Project, with the possible exception of recreational park facilities.

Traffic and Circulation

The No Project (No Build) Alternative would not introduce additional vehicle trips onto the study area roadways. It was determined that the proposed Project would cause an increase in traffic on roadways or intersections that would cause traffic operations to degrade to an unacceptable level of service. Mitigation was identified to alleviate long term impacts; however, certain

impacts were deemed to be significant and unavoidable. Under the No Project (No Build) Alternative, these potential impacts would be avoided, and the No Project (No Build) Alternative would have a reduced traffic impact when compared to the proposed Project.

Utilities

Implementation of the proposed Project would result in increased flows to the public wastewater system. The wastewater system is capable of handling the increased flows with their existing permit and infrastructure.

Implementation of the proposed Project would result in increased demand for potable water. The City has adequate water supply to handle the increased demand with their existing supply and infrastructure.

Implementation of the proposed Project would result in increased storm drainage from new impervious surfaces. The proposed Project includes a storm drainage collection system to handle the increased storm drainage.

Implementation of the proposed Project would result in increased generation of solid waste. However, the landfill has adequate capacity to dispose the solid waste.

Under the No Project (No Build) Alternative the Project site would not increase the demand for any utilities, including wastewater services, potable water supplies, or solid waste disposal. There would be no need to construct stormwater drainage infrastructure. Overall, the demand for utilities would be reduced under the No Project (No Build) Alternative when compared to the proposed Project.

INCREASED DENSITY ALTERNATIVE

Aesthetics and Visual Resources

As described in Section 3.1, the visual character of the Project site would be significantly altered as a result of Project implementation. Implementation of the proposed development standards and consistency with the General Plan and the Manteca Zoning Ordinance would ensure that impacts are reduced to the greatest extent possible. Nevertheless, impacts related to degradation of the visual character of the site would be significant and unavoidable. Additionally, implementation of the lighting plan required by Mitigation Measure 3.1-1 would ensure that lighting features do not result in light spillage onto adjacent properties and do not significantly impact views of the night sky. Adherence to the mitigation measure would ensure that excessively reflective building materials are not used, and that the proposed Project would not result in significant impacts related to daytime glare. As such, impacts related to nighttime lighting and daytime glare would be less than significant with mitigation.

These impacts would be similar with the Increased Density Alternative as this alternative is located on the same site and would have similar uses. This alternative would result in the same number of residential units and an increase in park/open space uses. The impacts of light and glare would still occur and could be mitigated to a less than significant level. The impacts to the

existing visual quality would be similar to the proposed Project as the Project site would be developed with the same uses as under the proposed Project, just at a higher density. However, due to the increase in park/open space areas, the Increased Density Alternative would have a slightly reduced impact on visual resources when compared to the proposed Project.

Agricultural Resources

Currently, the majority of the Project site is used for agricultural purposes. The Increased Density Alternative would result in development of the entire Project site. While this alternative would increase the amount of park/open space areas, these areas would still be converted from agricultural use. As such, this alternative would not reduce the impacts to agricultural lands when compared to the proposed Project. The loss of the agricultural land, including prime farmland, would be a significant and unavoidable impact under both the Increased Density Alternative and the proposed Project. Therefore, the Increased Density Alternative would have equal impacts on agricultural resources when compared to the proposed Project.

Air Quality

Under buildout conditions in San Joaquin County, the SJVAB would continue to experience increases in criteria pollutants and efforts to improve air quality throughout the basin would be hindered. As described in Section 3.3, San Joaquin County has a state designation of nonattainment for O_3, PM_{10}, and $PM_{2.5}$ and is either unclassified or attainment for all other criteria pollutants. The County has a national designation of nonattainment for O_3 and $PM_{2.5}$. Table 3.3-2 in Section 3.3 presents the state and federal attainment status for San Joaquin County.

As discussed under Impact 3.3-1 in Section 3.3, the proposed Project would result in increased emissions primarily from vehicle miles travelled associated with Project implementation. The SJVAPCD has established operations related emissions thresholds of significance and it was determined that annual emissions of ROG, NOx, and PM_{10} exceed the SJVAPCD thresholds of significance.

Even with basic mitigation incorporated into the model, the proposed Project would exceed the SJVAPCD thresholds of significance for operational ROG, NOx, and PM_{10}. The proposed Project is subject to the SJVAPCD Rule 9510 (Indirect Source Rule), which could result in substantial mitigation of NOx and PM emissions. The reductions are accomplished by the incorporation of mitigation measures into projects and/or by the payment of an Indirect Source Rule fee for any required reductions that have not been accomplished through Project mitigation commitments. The current fees are $9,350 per ton of NOx. The actual calculations will be accomplished by the SJVAPCD and Project applicants as individual projects are brought forward for approval under Rule 9510.

Implementation of the proposed Project would cause an increase in traffic, which is the dominant source of air emissions associated with the proposed Project. Under the Increased Density Alternative, the proposed Project would be developed with the same components as described in the Project Description, but the amount of park/open space uses would be

increased. The total development, including residential units and non-residential building square footage, would be equal to the proposed Project. Therefore, the amount of traffic generated from the Project site would be equal under this alternative and the proposed Project. Mobile source air emissions are directly correlated to traffic volume; therefore, it is estimated that the similar trip volume would result in a similar amount of the mobile source emissions. Additionally, the area source emissions would be similar to the Project.

Uses in the Increased Density Alternative would be required to adhere to the same mitigation measures as the proposed Project. The Increased Density Alternative would result in similar air emissions when compared to the proposed Project.

Biological Resources

As described in Section 3.4 Biological Resources, construction on the Project site has the potential to result in impacts to special-status species in the region. There are no known special-status species that have been observed on the Project site. Mitigation Measure 3.4-1 requires participation with the SJMSCP, which includes fees that will be used to purchase conservation lands for a variety of special status species. The SJMSCP was created and adopted to address both the Project and cumulative impacts to biological resources, including special status species. The proposed Project will participate in the SJMSCP, including payment of fees and implementation of all Incidental Take Minimization Measures required by the SJCOG through the authorization of SJMSCP coverage. Additionally, Mitigation Measure 3.4-2 requires the Project applicant to obtain authorization for fill from the regulatory agencies (USACE-404 permit, RWQCB-401 certification, 1600 Streambed Alteration Agreement). Through the implementation of these mitigation measures found in Section 3.4, implementation of the proposed Project will have a less than significant impact on biological resources.

The Increased Density Alternative would result in development of the entire Project site. Under this alternative, there would be approximately 15.94 more acres of park/open space land that may provide habitat for a variety of species. This addition of park and open space land would provide biological benefits even though the remainder of the Project site would be developed. As such, the Increased Density Alternative would result in slightly less impact to biological resources when compared to the proposed Project.

Cultural and Tribal Resources

As described in Section 3.5, during the field surveys conducted on the Project site there were no historical, archaeological, or paleontological resources identified. However, as with most projects in the region that involve ground-disturbing activities, there is the potential for discovery of a previously unknown cultural and/or historical resource or human remains. Implementation of mitigation measures in Section 3.5 would reduce unknown cultural resources impacts to a less than significant level.

The Increased Density Alternative would result in development of the entire Project site, but would increase the amount of park/open space areas by approximately 15.94 acres. Although the amount of park/open space areas would increase as compared to the proposed Project, the

entire Project site would be disturbed. This would result in a similar potential to disturb or destroy cultural, historic, and archaeological resources, as well as paleontological resources. While the proposed Project is not anticipated to result in significant impacts to cultural resources with mitigation, the Increased Density Alternative would result in a similar potential for impacts to cultural resources.

Geology, Soils, and Mineral Resources

As described in Section 3.6, implementation of the proposed Project would result in the construction of new structures on the Project site. The new structures would be subject to seismic, geologic, and soils hazards for the life of the Project. Mostly notably, the proposed Project would be subject to liquefaction, liquefaction induced settlement, lateral spreading, and expansive soils. Mitigation measures identified in Section 3.6 would reduce the potential impacts to a less than significant level.

Under the Increased Density Alternative, the amount of developed area would be similar to the Project and an equal number of structures would be subject to hazardous geological conditions. While the proposed Project is not anticipated to result in significant impacts from geology and soils with mitigation, the Increased Density Alternative would result in similar potential for impacts when compared to the proposed Project.

Greenhouse Gases and Climate Change

As stated previously, short-term construction GHG emissions are a one-time release of GHGs and are not expected to significantly contribute to global climate change over the lifetime of the proposed Project. With mitigation measures, the overall annual GHG emissions associated with the proposed Project would be reduced by approximately 15.7 percent by the year 2020 compared to the business as usual scenario, which is inconsistent with applicable standards and thresholds of a 29 percent reduction. The proposed Project demonstrates that it has included feasible Best Performance Standards (BPS) that will collectively reduce GHG emissions by 15.7 percent. Nevertheless, the proposed Project will result in a net increase in emissions that will contribute to global climate change. While the 15.7 percent reduction is a reflection of the proposed Project's intent to comply with the SJVAPCD's efforts to ensure that land development projects reduce GHG by incorporated BPSs, there will be an overall net increase in GHG emissions. Based on the criteria set forth in the SJVAPCD's Climate Change Action Plan, the proposed Project would have an individual and cumulative impact that is less than significant.

Under the Increased Density Alternative, the Project site would be developed with the same types of uses and structures as the proposed Project, but the amount of park/open space areas would be increased. All uses in the Increased Density Alternative would be required to adhere to the same mitigation measure as the proposed Project. The equal number of residential units would result in a corresponding equal level of greenhouse gas emissions when compared to the proposed Project. As such, the greenhouse gas emissions impact would be equal when compared to the proposed Project.

Hazards and Hazardous Materials

The proposed Project includes components that will likely use a variety of common hazardous materials including: paints, cleaners, cleaning solvents, pesticides, fertilizers, and fuel. There will be a risk of release of these materials into the environment if they are not stored and handled in accordance with best management practices approved by San Joaquin County Department of Environmental Health.

Under the Increased Density Alternative, the range of residential and non-residential uses on the site would not change when compared to the proposed Project, but the amount of park/open space areas would increase. This alternative would still use the hazardous materials identified under the proposed Project. As such, this alternative would have equal impacts from hazards and hazardous materials impacts when compared to the proposed Project.

Hydrology and Water Quality

As described in Section 3.9, implementation of the proposed Project has the potential to result in the violation of water quality standards and discharge of pollutants into surface waters during both construction and long-term operations. Construction operations could result in temporary increases in runoff, erosion, sedimentation, soil compaction and wind erosion effects that could adversely affect soils and reduce the revegetation potential at construction sites and staging areas. The long-term operation of the proposed Project could result in long-term impacts to surface water quality from urban stormwater runoff and could enter groundwater or surface water systems. Additionally, the proposed Project would not significantly impact groundwater recharge. Although the Project site is located within a 200-year flood hazard area, Mitigation Measure 3.9-3 would ensure that this impact is less than significant. Mitigation measures provided in Section 3.9 reduce potential water quality and flooding impacts to a less than significant level.

Under the Increased Density Alternative, potential construction-related and long-term operational impacts to water quality or waste discharge related to stormwater runoff would be slightly reduced equivalent to the amount of land area that remains as park/open space under this alternative. The increased areas of park and open space under this alternative will remain pervious to precipitation, which will facilitate groundwater recharge and the natural biofiltration of stormwater. This alternative will still include stormwater detention/basins, and provide natural BMPs to reduce pollutants in stormwater runoff. As such, potential impacts related to hydrology and water quality would be slightly reduced under the Increased Density Alternative when compared to the proposed Project.

Land Use, Population, and Housing

The proposed Project would result in direct population growth. The proposed Project would not result in indirect population growth beyond what was anticipated under the General Plan, or analyzed in detail in this EIR. The proposed Project would not displace any persons or housing units. The Project would require a zoning and general plan amendment for land use changes. However, impacts to land use are considered less than significant.

There is one barn structure located on the Project site. However, the barn appears abandoned and likely does not house any residents. Similar to the proposed Project, development of the Increased Density Alternative would remove the onsite barn, and add 1,265 residential units. Therefore, impacts relating to land use, population and housing would be equal under this alternative.

Noise

The proposed Project would increase noise-generating activities associated with the maintenance and operation of the proposed Project, as well as vehicular noise. The specific businesses that would occupy the Project site are not yet determined; therefore, an actual noise impact from commercial uses may or may not exist in the future. Mitigation measures provided in Section 3.11 would reduce all potential impact to a less than significant level.

The Increased Density Alternative would result in the same number of residential units and the same amount of commercial buildings as the Project; therefore, the noise impacts associated with the alternative would be equal to the vehicular and operational activities of the proposed Project. All noise issues would be mitigated, as appropriate, through noise attenuation and best management practices; therefore, under this alternative, noise impacts are equal when compared to the proposed Project.

Public Services and Recreation

Development in the proposed Project will pay all applicable fees and assessments required to fund its fair share of public services and recreation. This funding would assist in the development of facilities in order to meet the City's standards. The proposed Project would have a less than significant impact to fire, police, and schools, and Mitigation Measure 3.12-1 would reduce potential impacts related to recreational facilities.

Under the Increased Density Alternative, the site would be developed with the same range of allowable uses as described in the Project Description, and the size of the residential and non-residential components would be equal. The increase in park/open space areas may result in an increase in irrigation water demand; however, these open space areas would increase the potential for on-site stormwater detention. Additionally, the increase in park/open space areas would provide for an increase in recreational opportunities for the proposed residents as compared to the Project. As such, this impact would be slightly reduced when compared to the proposed Project.

Traffic and Circulation

As described in Section 3.14, implementation of the proposed Project would cause an increase in traffic on roadways or intersections. It was determined that the proposed Project would cause an increase in traffic on roadways or intersections that would cause traffic operations to degrade to an unacceptable level of service. Mitigation was identified to alleviate long term impacts; however, certain impacts were deemed to be significant and unavoidable.

Under the Increased Density Alternative, the proposed Project would be developed with the same components as described in the Project Description, and the size of the residential and non-residential components would be equal. The equal number of residential and non-residential uses would result in an equal amount of traffic generated from the Project site.

Uses in the Increased Density Alternative would be required to adhere to the same mitigation measures as the proposed Project. Therefore, the Increased Density Alternative would result in similar traffic related impacts when compared to the proposed Project.

Utilities

Implementation of the proposed Project would result in potential impacts to the public wastewater, water, storm drainage, and solid waste collection and disposal system. Mitigation measures provided in Section 3.14 would reduce these potential impacts to a less than significant level. Project impacts to wastewater, water, stormwater and solid waste facilities are all less than significant.

Under the Increased Density Alterative, the proposed Project would be developed with the same components as described in the Project Description, and the size of the residential and non-residential components would be equal. This would result in an equal amount of wastewater, water demand, and solid waste generated from the Project site. There would be approximately 15.94 more acres of pervious soils, thereby increasing opportunities for stormwater retention at the Project site. However, uses in the Increased Density Alterative would be required to adhere to the same mitigation measures as the proposed Project, and the equal amount of square footage would result in similar utility demands. The Increased Density Alternative would result in similar demand on utility systems when compared to the proposed Project.

Overall, this alternative would have equal wastewater treatment demand, equal water demand, equal solid waste generated, and equal storm water runoff when compared to the proposed Project. As such, this alternative would have equal impacts when compared to the proposed Project.

AGRICULTURE PROTECTION ALTERNATIVE

Aesthetics and Visual Resources

As described in Section 3.1, the visual character of the Project site would be significantly altered as a result of Project implementation. Implementation of the proposed development standards and consistency with the General Plan and the Manteca Zoning Ordinance would ensure that impacts are reduced to the greatest extent possible. Nevertheless, impacts related to degradation of the visual character of the site would be significant and unavoidable. Additionally, of the lighting plan required by Mitigation Measure 3.1-1 would ensure that lighting features do not result in light spillage onto adjacent properties and do not significantly impact views of the night sky. As such, impacts related to nighttime lighting and daytime glare would be less than significant with mitigation.

Under the Agriculture Protection Alternative, a portion of the Project site would remain under agricultural production, and therefore, would retain the existing visual character. However, portions of the Project site that are currently agricultural land would be converted to urban uses. As such, there would still be an impact to the visual character under this alternative. The impact associated with increased light and glare in the developed area would be mitigated. Under this alternative, the changes to the existing visual quality would be similar to the proposed Project in the areas that are developed, but would be significant less in the areas that are not developed. As such, this alternative would have a reduced impact that is proportionate to the reduced development area, when compared to the proposed Project.

Agricultural Resources

Development of the proposed Project would remove 248.225 acres of Farmland of Statewide Importance. This loss results in a significant and unavoidable impact.

The Agriculture Protection Alternative would reduce the amount of converted Prime Farmland and Farmland of Statewide Importance to approximately 129.14 acres. Provisions for payment of compensatory fees would partially offset conversions of farmland on the portion that would be developed; however, no new farmland would be made available, and the productivity of existing farmland would not be improved as a result of these measures. Therefore, full compensation for losses of Important Farmland under the Agriculture Protection Alternative would not be achieved resulting in a significant and unavoidable impact.

While this alternative would still result in a significant and unavoidable impact to agriculture, the land lost to urban uses is much less than under the proposed Project. As such, this alternative would have a reduced impact that is proportionate to the reduced development area, when compared to the proposed Project.

Air Quality

Under buildout conditions in San Joaquin County, the SJVAB would continue to experience increases in criteria pollutants and efforts to improve air quality throughout the basin would be hindered. As described in Section 3.3, San Joaquin County has a state designation of nonattainment for O_3, PM_{10}, and $PM_{2.5}$ and is either unclassified or attainment for all other criteria pollutants. The County has a national designation of nonattainment for $O_3$and $PM_{2.5}$. Table 3.3-2 in Section 3.3 presents the state and federal attainment status for San Joaquin County.

As discussed under Impact 3.3-1 in Section 3.3, the proposed Project would result in increased emissions primarily from vehicle miles travelled associated with Project implementation. The SJVAPCD has established operations related emissions thresholds of significance and it was determined that annual emissions of ROG, NOx, and PM_{10} exceed the SJVAPCD thresholds of significance.

Even with basic mitigation incorporated into the model, the proposed Project would exceed the SJVAPCD thresholds of significance for operational ROG, NOx, and PM_{10}. The proposed Project is

subject to the SJVAPCD Rule 9510 (Indirect Source Rule), which could result in substantial mitigation of NOx and PM emissions. The reductions are accomplished by the incorporation of mitigation measures into projects and/or by the payment of an Indirect Source Rule fee for any required reductions that have not been accomplished through Project mitigation commitments. The current fees are $9,350 per ton of NOx. The actual calculations will be accomplished by the SJVAPCD and Project applicants as individual projects are brought forward for approval under Rule 9510.

Implementation of the proposed Project would cause an increase in traffic, which is the dominant source of air emissions associated with the proposed Project. Under the Agricultural Protection Alternative, the proposed Project would be developed with the same components as described in the Project Description, but the size, number of units, and the Project footprint would be reduced resulting in an increase of undeveloped land. The total development would be reduced by approximately 50 percent. This reduction in square footage and residential units would represent an approximately 50 percent reduction in the amount of traffic generated from the Project site. Mobile source air emissions are directly correlated to traffic volume; therefore, it is estimated that the reduced trip volume would reduce the mobile source emissions by approximately the same 50 percent. Additionally, this alternative would have a reduction in area source emissions proportional to the reduction in square footage.

While uses in the Agricultural Protection Alternative would be required to adhere to the same mitigation measures as the proposed Project, the decrease in square footage and reduced traffic volumes would result in reductions in air emissions. Therefore, the Agricultural Protection Alternative would result in reduced air emissions when compared to the proposed Project.

Biological Resources

As described in Section 3.4 Biological Resources, construction on the Project site has the potential to result in impacts to special-status species in the region. There are no known special-status species that have been observed on the Project site. Mitigation Measure 3.4-1 requires participation with the SJMSCP, which includes fees that will be used to purchase conservation lands for a variety of special status species. The SJMSCP was created and adopted to address both the Project and cumulative impacts to biological resources, including special status species. The proposed Project will participate in the SJMSCP, including payment of fees and implementation of all Incidental Take Minimization Measures required by the SJCOG through the authorization of SJMSCP coverage. Additionally, Mitigation Measure 3.4-2 requires the Project applicant to obtain authorization for fill from the regulatory agencies (USACE-404 permit, RWQCB-401 certification, 1600 Streambed Alteration Agreement). Through the implementation of these mitigation measures found in Section 3.4, implementation of the proposed Project will have a less than significant impact on biological resources.

The Agriculture Protection Alternative would result in development on the Project site, but the development would be significantly reduced with 129.14 acres remaining in its current condition. The 129.14 acres that would remain undeveloped would include the agricultural land only. Under this alternative, there would be more acres of agricultural land that would provide

open space habitat for a variety of wildlife species, predominately associated with foraging (i.e. protected raptors including Swainson's hawk, migratory birds). This additional agricultural land would provide biological benefits to wildlife in the region even though a portion of the Project site would still be developed. As such, the Agriculture Protection Alternative would have a reduced impact that is proportionate to the reduced development area, when compared to the proposed Project.

Cultural and Tribal Resources

As described in Section 3.5, during the field surveys conducted on the Project site there were no historical, archaeological, or paleontological resources identified. However, as with most projects in the region that involve ground-disturbing activities, there is the potential for discovery of a previously unknown cultural and/or historical resource or human remains. Implementation of mitigation measures in Section 3.5 would reduce unknown cultural resources impacts to a less than significant level.

Under this Agricultural Protection Alternative, there would be less ground disturbing activities related to development and there would be a reduced potential to disturb or destroy cultural, historic, and archaeological resources, as well as paleontological resources. While the proposed Project is not anticipated to result in significant impacts to cultural resources with mitigation, the Agricultural Protection Alternative would have a reduced impact that is proportionate to the reduced development area, when compared to the proposed Project.

Geology, Soils, and Mineral Resources

As described in Section 3.6, implementation of the proposed Project would result in the construction of new structures on the Project site. The new structures would be subject to seismic, geologic, and soils hazards for the life of the Project. Mostly notably, the proposed Project would be subject to liquefaction, liquefaction induced settlement, lateral spreading, and expansive soils. Mitigation measures identified in Section 3.6 would reduce the potential impacts to a less than significant level.

Under the Agriculture Protection Alternative, there would be less developed area, resulting in fewer structures that would be subject to geological conditions. The Agricultural Protection Alternative would result in more of the Project site remaining in its existing undeveloped condition. While the proposed Project is not anticipated to result in significant impacts from geology and soils with mitigation, the Agricultural Protection Alternative would have a reduced impact that is proportionate to the reduced development area when compared to the proposed Project.

Greenhouse Gases and Climate Change

As stated previously, short-term construction GHG emissions are a one-time release of GHGs and are not expected to significantly contribute to global climate change over the lifetime of the proposed Project. With mitigation measures, the overall annual GHG emissions associated with the proposed Project would be reduced by approximately 15.7 percent by the year 2020

compared to the business as usual scenario, which is inconsistent with applicable standards and thresholds of a 29 percent reduction. The proposed Project demonstrates that it has included feasible Best Performance Standards (BPS) that will collectively reduce GHG emissions by 15.7 percent. Nevertheless, the proposed Project will result in a net increase in emissions that will contribute to global climate change. While the 15.7 percent reduction is a reflection of the proposed Project's intent to comply with the SJVAPCD's efforts to ensure that land development projects reduce GHG by incorporated BPSs, there will be an overall net increase in GHG emissions. Based on the criteria set forth in the SJVAPCD's Climate Change Action Plan, the proposed Project would have an individual and cumulative impact that is less than significant.

Under the Agriculture Protection Alternative, the Project site would be developed with the same uses as the proposed Project in the developed area, but the total footprint and square footage would be significantly reduced. While uses in the Agricultural Protection Alternative would be required to adhere to the same mitigation measure as the proposed Project, the significant decrease in square footage and total residential unit count would significantly decrease the total greenhouse gas emissions. As such, the greenhouse gas emissions impact is significantly reduced when compared to the proposed Project.

Hazards and Hazardous Materials

The proposed Project includes components that will likely use a variety of common hazardous materials including: paints, cleaners, cleaning solvents, pesticides, fertilizers, and fuel. There will be a risk of release of these materials into the environment if they are not stored and handled in accordance with best management practices approved by San Joaquin County Department of Environmental Health.

Under the Agriculture Protection Alternative, the range of residential and non-residential uses on the site would not change when compared to the proposed Project, but the number of residences and the square footage of non-residential uses would decrease. This alternative would still use the hazardous materials identified under the proposed Project, but in smaller quantities, given the reduction in development intensity. As such, this alternative would have reduced impacts from hazards and hazardous materials impacts when compared to the proposed Project.

Hydrology and Water Quality

As described in Section 3.9, implementation of the proposed Project has the potential to result in the violation of water quality standards and the discharge of pollutants into surface waters during both construction and long-term operations. Construction operations could result in temporary increases in runoff, erosion, sedimentation, soil compaction and wind erosion effects that could adversely affect soils and reduce the revegetation potential at construction sites and staging areas. The long-term operation of the proposed Project could result in long-term impacts to surface water quality from urban stormwater runoff and could enter groundwater or surface water systems. Additionally, the proposed Project would not significantly impact groundwater recharge. Although the Project site is located within a 200-year flood hazard area, Mitigation Measure 3.9-3 would ensure that this impact is less than significant. Mitigation

measures provided in Section 3.9 reduce potential water quality and flooding impacts to a less than significant level.

Under the Agricultural Protection Alternative, potential construction-related and long-term operational impacts to water quality or waste discharge related to stormwater runoff would be reduced equivalent to the amount of land area that remains undisturbed.

The undeveloped land will remain pervious to precipitation and will not have the potential to discharge urban pollutants into surface water resources. This alternative would include a stormwater detention/basin, and provide natural BMPs to reduce pollutants in stormwater runoff from the developed areas. As such, potential impacts related to hydrology and water quality would be reduced proportionate to the reduced development area under the Agricultural Protection Alternative when compared to the proposed Project.

Land Use, Population, and Housing

The proposed Project would result in direct population growth. The proposed Project would not result in indirect population growth beyond what was anticipated under the General Plan, or analyzed in detail in this EIR. The proposed Project would not displace any persons or housing units. The Project would require a zoning and general plan amendment for land use changes. However, impacts to land use are considered less than significant.

The Agricultural Protection Alternative is not expected to induce substantial population growth in the area but would displace persons and remove one existing barn structure. The amount of population growth and the number of housing units removed under this alternative would be reduced when compared to the proposed Project. The land use impacts would be reduced under this alternative by reducing agricultural land that is converted to residential and commercial uses. Therefore, impacts relating to land use, population, and housing would be reduced under this alternative proportionate to the reduced development area.

Noise

The proposed Project could increase noise-generating activities associated with the maintenance and operation of the proposed Project, as well as from vehicular traffic. The specific businesses that would occupy the Project site are not yet determined; therefore, an actual noise impact from commercial uses may or may not exist in the future. Mitigation measures provided in Section 3.11 would reduce all potential impact to a less than significant level.

Because the Agricultural Protection Alternative would result in less development, the noise impacts associated with future uses would be reduced when compared to the proposed Project. The preserved agriculture area would involve the use of farming equipment and haul trucks that would cause a noise impact; however, the noises related to the agricultural activities already exist, and therefore, this would not introduce a new source of noise to the area. All other noise issues in the developed areas would be similar to the proposed Project, but on a reduced scale given the 50 percent decrease in development intensity under this alternative. Under this

alternative, noise impacts would be reduced proportionate to the reduced development area when compared to the proposed Project.

Public Services and Recreation

Development in the proposed Project will pay all applicable fees and assessments required to fund its fair share of public services and recreation. This funding would assist in the development of facilities in order to meet the City's standards. The proposed Project would have a less than significant impact to fire, police, and schools, and Mitigation Measure 3.12-1 would reduce potential impacts related to recreational facilities.

Under the Agricultural Protection Alternative, the site would be developed with the same range of allowable uses as described in the Project Description, but the size of the non-residential buildings and number of residential units would be reduced, resulting in an increase of undeveloped land by 50 percent. The total development would be reduced by approximately 50 percent. This reduction in non-residential building square footage and total residential housing units would represent an approximately 50 percent reduction in the amount of public service needs from the Project site. As such, this impact would be reduced when compared to the proposed Project.

Traffic and Circulation

As described in Section 3.14, implementation of the proposed Project would cause an increase in traffic on roadways or intersections that would cause traffic operations to degrade to an unacceptable level of service. Under the Agricultural Protection Alternative, the proposed Project would be developed with the same components as described in the Project Description, but the size of the buildings, Project footprint, and the number of residential units would be reduced resulting in an increase of undeveloped land. The total development would be reduced by approximately 50 percent. This reduction in non-residential building square footage and residential units would represent an approximately 50 percent reduction in the amount of traffic generated from the Project site.

Uses in the Agricultural Protection Alternative would be required to adhere to the same mitigation measures as the proposed Project and the decrease in square footage and residential uses, and the corresponding decreases in traffic volumes would result in reductions in traffic congestion. Therefore, the Agricultural Protection Alternative would result in significantly reduced traffic related impacts when compared to the proposed Project.

Utilities

Implementation of the proposed Project would result in potential impacts the public wastewater, water, storm drainage, and solid waste collection and disposal system. However, mitigation measures provided in Section 3.14 would reduce these potential impacts to a less than significant level. Project impacts to wastewater, water, stormwater and solid waste facilities are all less than significant.

Under the Agricultural Protection Alternative, the proposed Project would be developed with the same components as described in the Project Description, but the size of the buildings, overall Project footprint, and number of units would be reduced resulting in an increase of undeveloped land. The total development would be reduced by approximately 50 percent. This reduction in square footage and footprint would represent an approximately 50 percent reduction in the amount of wastewater and solid waste generated from the Project site. This reduction would also reduce water demand by approximately 50 percent. There would be approximately 129.14 more acres of pervious soils, thereby reducing the amount of storm drainage from the Project site. While uses in the Agricultural Protection Alternative would be required to adhere to the same mitigation measures as the proposed Project, the decrease in square footage and residential units would reduce the utility demands.

Overall, this alternative would have less wastewater treatment demand, less water demand, less solid waste generated, and less storm water runoff when compared to the proposed Project. As such, this alternative would have a reduced impact when compared to the proposed Project.

ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA requires that an environmentally superior alternative be identified among the alternatives that are analyzed in the EIR. If the No Project (No Build) Alternative is the environmentally superior alternative, an EIR must also identify an environmentally superior alternative among the other alternatives (CEQA Guidelines Section 15126.6(e)(2)). The environmentally superior alternative is that alternative with the least adverse environmental impacts when compared to the proposed Project.

Table 5.0-1 presents a comparison of the alternative Project impacts with those of the proposed Project.

TABLE 5.0-1: COMPARISON OF ALTERNATIVE PROJECT IMPACTS TO THE PROPOSED PROJECT

ENVIRONMENTAL ISSUE	*NO PROJECT (NO BUILD) ALTERNATIVE*	*INCREASED DENSITY ALTERNATIVE*	*AGRICULTURE PROTECTION ALTERNATIVE*
Aesthetics and Visual Resources	Less (Best)	Less (3rd Best)	Less (2nd Best)
Agricultural Resources	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Air Quality	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Biological Resources	Less (Best)	Less (3rd Best)	Less (2nd Best)
Cultural and Tribal Resources	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Geology, Soils, and Mineral Resources	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Greenhouse Gases and Climate Change	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Hazards and Hazardous Materials	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Hydrology and Water Quality	Less (Best)	Less (3rd Best)	Less (2nd Best)
Land Use, Population, and Housing	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Noise	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Public Services and Recreation	Less (Best)	Less (3rd Best)	Less (2nd Best)
Transportation and Circulation	Less (Best)	Equal (3rd Best)	Less (2nd Best)
Utilities	Less (Best)	Equal (3rd Best)	Less (2nd Best)

GREATER = GREATER IMPACT THAN THAT OF THE PROPOSED PROJECT

LESS = LESS IMPACT THAN THAT OF THE PROPOSED PROJECT

EQUAL = NO SUBSTANTIAL CHANGE IN IMPACT FROM THAT OF THE PROPOSED PROJECT

As shown in the table, the No Project (No Build) Alternative is the environmentally superior alternative. However, as required by CEQA, when the No Project (No Build) Alternative is the environmentally superior alternative, the environmentally superior alternative among the others must be identified. Therefore, the Increased Density and Agricultural Protection Alternatives both rank higher than the proposed Project. Comparatively, the Agricultural Protection Alternative would result in less impact then the Increased Density Alternative because it provides the greatest reduction of potential impacts in comparison to the proposed Project. It should be noted that the Agricultural Protection Alternative and Increased Density Alternative do not meet all of the Project objectives.

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Appendix A

Notice of Preparation and NOP Comments

NOTICE OF PREPARATION

FOR THE

OAKWOOD LANDING –
CERRI & DENALI SUBDIVISIONS

AUGUST 2016

Prepared for:

Manteca Community Development Department, Planning Division
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Prepared by:

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De Novo Planning Group

A Land Use Planning, Design, and Environmental Firm

NOTICE OF PREPARATION

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Notice of Preparation of an Environmental Impact Report and Scoping Meeting

Date: August 18, 2016

Subject: Notice of Preparation of an Environmental Impact Report and Scoping Meeting for the Oakwood Landing – Cerri & Denali Subdivisions

To: State Clearinghouse
State Responsible Agencies
State Trustee Agencies
Other Public Agencies
Organizations and Interested Persons

Lead Agency: Rochelle Henson, Senior Planner
Manteca Community Development Department, Planning Division
1001 West Center Street
Manteca, CA 95337
(209) 456-8516

Notice of Preparation: This is to notify public agencies and the general public that the City of Manteca, as the Lead Agency, will prepare an EIR for the Oakwood Landing – Cerri & Denali Subdivisions. The City of Manteca is interested in the input and/or comments of public agencies and the general public as to the scope and content of the environmental information that is germane to the agencies' statutory responsibilities in connection with the proposed Project, and public input. Responsible/trustee agencies will need to use the EIR prepared by the City of Manteca when considering applicable permits, or other approvals for the proposed Project.

Comment Period: Consistent with the time limits mandated by State law, your input, comments or responses must be received in writing and sent at the earliest possible date, but not later than 5:00 PM, September 19, 2016.

Comments/Input: Please send your comments/input (including the name for a contact person in your agency) to: Attn: Rochelle Henson at the City of Manteca, 1001 West Center Street, Manteca, CA 95337.

Scoping Meeting: On September 14, 2016, the City of Manteca will conduct a public scoping meeting to solicit input and comments from public agencies and the general public on the proposed Project and scope of the Environmental Impact Report (EIR). This meeting will be held at the Administration Conference Room at the Manteca City Hall from 1 PM to 2 PM.

This meeting will be an open house format and interested parties may drop in to review the proposed Project exhibits and submit written comments at any time between 1 PM and 2 PM. Representatives from the City of Manteca and the EIR consultant will be available to address questions regarding the EIR process and scope. Members of the public may provide written comments throughout the meeting.

If you have any questions regarding the scoping meeting, contact Rochelle Henson, Senior Planner at (209) 456-8516 or rhenson@ci.manteca.ca.us.

Project Title: Oakwood Landing – Cerri & Denali Subdivisions

1. Project Location

The Project site is located in the southwestern portion of the City of Manteca city limits. The Project site is immediately southeast of the intersection of Bronzan Road and McKinley Avenue. The Project site is bounded on the north by an existing dirt roadway between Bronzan Road and Atherton Drive, on the east by South McKinley Avenue and an existing residential subdivision, on the south by existing agricultural fields, and on the west by existing agricultural fields and the future Atherton Drive right-of-way. The Project site is located within Section 2 of Township 2 North, Range 7 East MDBM. The Project site is shown on the Manteca, California, 7.5-minute series quadrangle map. Figures 1 and 2 show the Project's regional location and vicinity.

2. Project Setting

A. EXISTING SITE CONDITIONS

The Project site is made up of four assessor parcels (APNs), which are listed in Table 1, and are displayed on Figure 3. The total Project site acreage, 258.29 acres, includes four assessor parcels (255.11 acres) and portions of the Woodward Avenue and McKinley Avenue right-of-way (3.18 acres).

TABLE 1: PARCELS WITHIN THE PROJECT SITE

APN / RIGHT OF WAY	*ACREAGE*
241-26-012	11.59
241-32-020	81.38
241-26-004	74.30
241-32-061	83.09
Public Right-of-Way	3.18
Total	**258.29**

The Project site is relatively flat with natural gentle slope from north to south. The Project site topography ranges in elevation from approximately 20 to 30 feet above sea level. Figure 4 shows the U.S. Geological Survey (USGS) Topographic Map of the Project site.

The Project site has some existing improvements including an existing barn area with associated equipment, dirt and paved roadways, and irrigation ditches. The majority of the Project site is in active agricultural use. The barn structure is located in the central portion of the Project site. Additionally, Woodward Avenue traverses the center of the Project site from east to west, and

McKinley Avenue traverses the northern portion of the Project site from north to south. Figure 25 shows aerial imagery of the existing site uses within the Project site.

B. Surrounding Land Uses

Uses immediately adjacent to the east, south, and west of the Project site include agricultural and residential uses, including ranchettes and large estates lots. Other existing uses east of the northerly portion of the Project site include a single family residential subdivision west of South Airport Way. Existing and future residential subdivisions also exist to the west of the Project site. Other nearby uses includes rural residential uses north of the Project site and south of State Route (SR) 120.

C. Existing Land Uses and Zoning

The Project site is currently located in the southwestern portion of the City of Manteca city limits.

Existing City of Manteca General Plan Land Use Designations

The Manteca General Plan 2023 designates the Project site as Urban Reserve Business Industrial Park (UR-BIP Floor Area Ratio [FAR] 1.0), Urban Reserve Very Low Density Residential (UR-VLDR less than 2.0 dwelling units per acre [du/ac]), Business Industrial Park (BIP FAR 1.0), Commercial Mixed Use (CMU 15.1 to 25 du/ac), General Commercial (GC FAR 0.6), and Open Space (OS). Figure 6 depicts the Manteca General Plan 2023 land use designations for the Project site and the surrounding areas. The General Plan contains the following standards to guide development for these land uses:

UR-BIP (Urban Reserve Business Industrial Park): Urban Reserve is applied to many properties around the perimeter of the City. In most instances, the Urban Reserve category overlies another land use category.

UR-VLDR (Urban Reserve Very Low Density Residential): Urban Reserve is applied to many properties around the perimeter of the City. In most instances, the Urban Reserve category overlies another land use category.

BIP (Business Industrial Park): The BIP designation is intended to provide sites for large uses in an office park environment that would include multi-tenant buildings. Business parks of this nature are well suited for research and development facilities and also provide an attractive business environment for unrelated businesses. Typical uses permitted within the Business Industrial Park land use include: administrative and general office, corporate or regional headquarters, research and development facilities, medical offices, professional services such as attorneys, accountants and insurance, and light industrial, including manufacturing and assembly.

CMU (Commercial Mixed Use): The CMU designation will accommodate a variety of purposes including high density residential, employment centers, retail commercial, and professional offices.

GC (General Commercial): The GC designation provides for wholesale, warehousing, and heavy commercial uses, highway oriented commercial retail, public and quasi-public uses, and similar and compatible uses. The designation is also intended to accommodate visitor commercial, lodging, commercial recreation and public gathering facilities, such as amphitheaters, or public gardens.

OS (Open Space): The OS designation encompasses habitat, open space, natural areas, lands of special status species, wetlands and riparian areas. These areas are set aside as permanent open space preserves to protect environmentally sensitive areas.

Existing City of Manteca Zoning Designations

The Manteca Zoning Ordinance designates the Project site for Business Industrial Park (BIP), General Commercial (CG), Commercial Mixed Use (CMU), Open Space (OS), and Undesignated (UND) uses. Below is a general description of City zoning within the Project site. The City zoning designations for the Project site and surrounding area are shown on Figure 7.

BIP Zone (Business Industrial Park): This designation creates large sites for office park environment that includes multi-tenant buildings. The BIP Zone will be well suited for research and development facilities and light industrial uses, as well as professional and medical offices. Warehouses will be permitted but limited in size. Specifically, this zone allows for research and development, small-scale manufacturing, business support service, and utility, transportation, communication, and public facility uses. The maximum FAR in the BIP Zone is 1.0 and the maximum building height is 35 feet.

CG Zone (General Commercial): This category provides for wholesale, warehousing, and heavy commercial uses, highway-oriented commercial retail, public and quasi-public uses, and similar and compatible uses. The CG Zone is also intended to accommodate visitor lodging, commercial recreation and public gathering facilities, such as amphitheaters, or public gardens. It also allows most neighborhood and mixed commercial uses. Specifically, this zone allows for animal-related uses, recreation and public assembly uses, retail/service uses, and utility, transportation, communication, and public facility uses. The maximum FAR in the CG Zone is 0.6.

CMU Zone (Commercial Mixed Use): This designation will accommodate a variety of uses including high-density residential, employment centers, retail commercial, and professional offices. Specifically, this zone allows for some residential uses, animal-related uses, recreation and public assembly uses, public transportation facility uses, and retail, service, and office uses. The allowed density in the CMU Zone is 15.1 to 25.0 du/ac and the maximum FAR is 1.0 and the maximum building height is 35 feet.

OS Zone (Open Space): This designation is set aside for habitat, open space, natural areas, lands of special-status species, wetlands, and riparian areas. These areas are set aside as permanent open space preserves to protect environmentally sensitive areas. This zone allows for community garden uses, outdoor commercial or community recreation uses, and resource protection and restoration uses.

UND Zone (Undesignated): The City's Zoning Ordinance does not contain allowed uses or development standards for the UND Zone.

Surrounding General Plan Designations

Adjoining lands to the north of the Project site are designated GC, BIP, OS, Public/Quasi-Public (PQP), and High Density Residential (HDR). Lands to the east of the Project site are designated Low Density Residential (LDR), Park (P), GC, and HDR. Lands to the south of the Project site are designated OS, UR-VLDR, Agriculture (AG), and LDR. Lands to the west of the Project site are designated GC, LDR, and OS. The City of Manteca General Plan land use designations for the Project site and surrounding areas are shown on Figure 6.

3. Project Goals and Objectives

Consistent with Section 15124(b) of the California Environmental Quality Act (CEQA) Guidelines, a clear statement of objectives and the underlying purpose of the proposed Project shall be discussed. The quantifiable objectives of the proposed Project include development of the 258.29-acre Project site, which will include: Low Density Residential, High Density Residential, General Commercial, and Open Space.

The Oakwood Landing – Cerri & Denali Subdivisions Project identifies the following objectives:

- Establish a mixed use project with residential, commercial, and public facilities that collectively provide for local and regional housing and employment opportunities and that take advantage of the area's high level of accessibility.
- Low Density Residential: Provide residential housing opportunities that are visually attractive and accommodate the future housing demand in Manteca.
- General Commercial: Establish a core of regional and local serving business and commercial uses that capitalize upon the visibility and access provided by SR 120.
- Public Facilities: Provide infrastructure, park space, and open space that meets City standards, is integrated with existing and planned facilities and connections, and increases recreation opportunities for existing and future residents of the City.

Phasing: Establishes a logical phasing plan designed to ensure that each phase of development would include necessary public improvements required to meet City standards.

4. Project Characteristics and Description

The proposed Project is primarily a residential development anticipated to provide up to 1,265 units. Additionally, the proposed Project includes 13.0 acres of general commercial uses anticipated to provide up to approximately 237,838 square feet of commercial. The Project would provide approximately 16.06 acres of parkland and would maintain approximately 6.77 acres of open space.

The Oakwood Landing Site Plan is shown on Figure 8a. However, as the plan area is developed in phases over time, the location of these lot size and types may be moved around based on demand and market conditions.

Other land uses to support and compliment the proposed residential community include:

- Park and open space - parks, landscaping, non-vehicular circulation, storm water filtration and retention/dual use park areas; and
- Roadway circulation - arterial and collector streets with bicycle and pedestrian circulation.

As shown in Table 2, the proposed Project would include development of up to 290 HDR units, 975 LDR units, and 237,838 square feet of GC uses.

TABLE 2: LAND USE SUMMARY

PROPOSED LAND USE DESIGNATIONS	*APPROXIMATE ACRES*	*ALLOWABLE DENSITY (OR FAR)*	*PROPOSED AVERAGE DENSITY (OR FAR)*	*PROJECTED NUMBER OF UNITS (OR SQUARE FEET)*
HDR	11.59	15.1 to 25.0	25.0	290 units
LDR	226.93	2.1 to 8.0	4.3	975 units
GC	13.00	0.6	0.43	237,838 SF
OS	6.77	--	--	--
Total	**258.29**	**--**	**--**	**1,265 units / 237,838 SF**

Development of the proposed Project will depend on market conditions and demand. The plan for infrastructure allows for development to occur in phases to respond to the market conditions and demand.

A. RESIDENTIAL DEVELOPMENT AREAS

The proposed Project will provide a variety of housing types and lot sizes that will accommodate a range of housing objectives and buyer needs with a goal to ensure housing for a variety of families and lifestyles. As shown in Table 2 above, at full build-out, the Project site will accommodate up to 1,265 residential units.

The residential areas are divided into two tentative subdivision maps. One subdivision map, the Denali Subdivision, would subdivide the northern 83.09-acres of the Project site into 319 single family residential lots. Lot sizes within the Denali Subdivision would range from 5,000 square feet to 16,300 square feet. A 6.06-acre park/basin area would be located in the central portion of the Denali Subdivision. Additionally, a 1.0-acre upland play area would be located adjacent to the park/basin. See Figure 8b for the tentative subdivision map for the Denali Subdivision.

The second tentative subdivision map, the Cerri Subdivision, would subdivide the southern 160.43-acres of the Project site into 656 single family residential lots. Lot sizes within the Cerri Subdivision would range from 3,808 square feet to 14,883 square feet. An approximately 9.0-acre park/basin area would be located in the southern portion of the Cerri Subdivision. See Figure 8c for the tentative subdivision map for the Cerri Subdivision.

Additionally, 11.59-acres of the Project site would be developed into a maximum of 290 HDR multifamily residential unit development. A Site Plan Review application for the HDR portion of the Project has not been completed. The land use and development standards for the proposed residential development areas shall comply with all requirements that apply to the corresponding zoning in the Manteca Municipal Code.

B. Commercial Development Area

The proposed Project would include development of up to 237,838 square feet of GC uses on approximately 13.0 acres in the northernmost portion of the Project site. A tentative subdivision map or a development proposal for the GC portion of the Project has not been completed. The GC site provides an opportunity to locate retail and services scaled to serve the proposed Project and surrounding neighborhoods to enhance the overall walkability within the Project site and to further minimize reliance on vehicles.

The exact use of the proposed commercial site has not been determined. The City's Zoning Code allows for the following uses within the CG Zoning District: emergency shelter, supportive housing, transitional housing, animal sales and grooming, veterinary facility, indoor fitness and sports facility, outdoor commercial recreation, school, specialized education and training/studio, theatre/auditorium, park-and-ride facility, parking facility, public safety facility, transit facility, utility facility and infrastructure, wireless telecommunication facility (minor), alcoholic beverage sales, building materials store/yard, business support services, child day care center, convenience store, grocery store/supermarket, home improvement supplies, hotel and motel, maintenance and repair of small equipment, massage therapy, medical services (general), mortuary/funeral home, neighborhood market, office, business and professional, personal services, restaurant, retail (general), auto part sales, car washing and detailing, manufacturing (small scale), and recycling facility (collection). Other uses within the CG Zoning District are also conditionally permitted with a Conditional Use Permit. As shown in Table 2, at full build-out, the 13.0-acre commercial site would provide up to 237,838 square feet of commercial uses.

C. Parks and Open Space

As shown in Figures 8b and 8c, approximately 16.06 acres of park and recreation facilities will be provided within the Project site in a variety of forms, consistent with the City's General Plan. Additionally, approximately 6.77 acres of open space would remain in the southeastern corner of the Cerri subdivision. After dedication to the City, the parks, parkways, and recreation facilities will be under the jurisdiction of the City, and will be operated and maintained by the City for the enjoyment of the residents of Manteca. Maintenance will be funded through a services community facilities district. The park sites shown on Figures 8b and 8c indicate conceptual park locations. Actual locations of parks and dual use basins may change as the Project site is developed. Parks and parkways are shown for reference only. Parks may include community or neighborhood parks with active and passive components as approved by the City. Park acreage and facilities shall occur within the Project site in a variety of forms as determined by the City during the mapping and improvement plan process. Parks may feature play fields, children play areas, picnic areas, ball courts, open lawn areas, or other amenities. Park areas will be designed in conjunction with storm water basins.

D. Circulation

The proposed Project will participate with and expand the existing circulation system in the City of Manteca. Additionally, the Project will provide sidewalks and bike lanes to offer additional bicycling and walking facilities for all of Manteca's residents. The Project site is a natural

progression of the existing housing areas and street network on the south side of the City and ties directly to the existing roadway network. The Project site is bordered on the north by an existing dirt roadway between Bronzan Road and Atherton Drive, on the east by South McKinley Avenue and an existing residential subdivision, on the south by existing agricultural fields, and on the west by existing agricultural fields and the future Atherton Drive right-of-way.

The proposed Project includes a hierarchy of roadways to increase the capacity of the existing street network as well as provide additional vehicular access to new residential areas within the Project site that will also benefit the vehicular circulation for the entire City. As shown in Figure 8a, the main arterial roadways of Atherton Drive, Woodward Avenue, and McKinley Avenue will remain as the key access roads for the Project. Additionally, a portion of Atherton Drive and McKinley Avenue will be included through the Project site in the overall circulation plan per the City's General Plan Circulation Element. The neighborhoods within the Project site will include entry drives, residential collectors, and residential streets to provide a comprehensive network of streets to provide vehicular access into and through the site. Additionally, sidewalks and bicycle lanes shall be provided in conjunction with the design of the vehicular circulation to offer a safe, aesthetic, and preferred alternative to reliance on the car. Further, a north-south separated bicycle/walking paths would be provided within the Cerri subdivision, which would connect to the proposed 9.0-acre park/basin area.

E. General Plan Amendment

The proposed Project would require a City of Manteca General Plan Amendment to the Land Use Element to change land uses on the Project site. Changes to the Land Use Element would include changing approximately 121.67 acres of BIP to LDR uses; changing approximately 70.0 acres of UR-BIP to LDR uses; changing approximately 9.39 acres of UR-VLDR to LDR uses; changing approximately 23.41 acres of CMU to LDR uses; changing approximately 11.59 acres of BIP to HDR uses; maintaining approximately 13.0 acres as GC; and maintaining approximately 6.77 acres of OS. It is noted that parks would be permitted within the proposed LDR uses. Figure 6 illustrates the current Manteca General Plan land uses within the Project site. The proposed General Plan land uses are shown on Figure 9.

F. Zoning Amendment

The Project site is currently within the jurisdiction of the City of Manteca. The land uses as proposed are not consistent with the Manteca Zoning Code and, thus, the proposed Project would require a City of Manteca Zoning Amendment to change land uses on the Project site. Changes to the Zoning Map would include changing approximately 79.39 acres of UND to R-1 uses; changing approximately 121.67 acres of BIP to R-1 uses; changing approximately 23.41 acres of CMU to R-1 uses; approximately 11.59 acres of BIP to R-3 uses; maintaining approximately 13.0 acres as CG; and maintaining approximately 6.77 acres of OS. The proposed zoning for the Project site is shown on Figure 10.

G. Tentative Subdivision Maps

As noted previously, the proposed Project site would ultimately be divided into two tentative subdivision maps. One tentative subdivision map, the Cerri Subdivision, would subdivide the southern 160.43-acres of the Project site into 656 single family residential lots with an approximately 9.0-acre park/basin area. The second subdivision map, the Denali Subdivision, would subdivide the northern 83.09-acres of the Project site into 319 single family residential lots with a 6.06-acre park/basin area, a 1.0-acre upland play area, and 6.77 acres of open space.

H. Utilities and Planned Infrastructure Improvements

The construction of onsite infrastructure improvements would be required to accommodate development of the proposed Project, as described below.

Potable Water System: As shown in Figures 11a, 11b, 12a, and 12b, development areas proposed by the Project would be served by a new potable water distribution system. Development of the proposed potable water system will require the installation of additional water mains within the proposed roadways to comply with the 2005 City of Manteca Master Water Plan. Additionally, a potable well site would be installed within the Cerri subdivision to the southwest of the proposed park/basin. The proposed on-site water distribution system will have various points-of-connection to the City mains. Each will connect to the existing water main lines in Atherton Drive, Woodward Avenue, McKinley Avenue, and Bronzan Road. Additionally, an internally looped system of water lines will be installed within the Project site. A water system analysis will be prepared during future design phases to monitor compliance with City of Manteca fire flow and pressure standards.

The proposed water distribution system may utilize Best Management Practices (BMP) and design control features, including the following Low Impact Development (LID) measures:

1. Implementation of the City of Manteca water recycling program for irrigation of public areas.
2. Irrigation system designs may include “purple pipe” for distribution of recycled water.
3. Reduction of turf areas on lots.
4. Use of rain gardens on lots and in public areas.
5. Use of drought-resistant vegetation in landscaping on lots and public areas.
6. Use of native trees and vegetation for landscaping on lots and in public areas.
7. Lot designs may include features that receive roof runoff from downspouts and provide for reuse of rainwater for irrigation.

Non-Potable Water: As shown in Figures 11a, 11b, 12a, and 12b, Project site development would include the development of an on-site non-potable water distribution system that would eventually provide irrigation water to planned parks, open space, and landscaped areas. All landscape irrigation is to be installed with non-potable components.

Connection from all irrigation systems to the non-potable water service will be provided in the proposed streets. This connection is to be provided per the requirements of the City Water Division with a valve whether the irrigation is provided by a well or not. In the future, when the non-potable system is charged by the City, the irrigation will be provided by the non-potable water system with the irrigation well remaining as a back-up only. Irrigation shall be designed to maximize efficiency and meet the requirements of the City Parks Maintenance Division.

Wastewater System: As shown in Figures 11a, 11b, 12a, and 12b, development areas proposed by the Project would be served by a new wastewater distribution system. As shown in Figure 12b, a temporary sewer lift station would be developed in the northern corner of the park/basin area within the Cerri subdivision. The proposed wastewater conveyance facilities would connect

to the existing and planned City of Manteca collection and treatment system. For example, as shown in Figure 12b, sewer within the Cerri subdivision would connect to the "Trail of Manteca" Project regional sewer lift station adjacent west of the Project site.

Wastewater treatment would be provided at the City's existing Wastewater Quality Control Facility (WQCF) at 2450 West Yosemite Avenue in western Manteca. The Project site is located within the South Manteca Collection Shed (SMCS). The backbone of the SMCS is the South Manteca Trunk Sewer (SMTS) along Woodward Avenue. The construction of a deep sewer along Woodward Avenue allows for future abandonment of Woodward Park Pump Station and would accommodate development while minimizing construction of infrastructure in South Manteca. Several sections of the SMCS have been constructed or designed in preparation for construction. Phased construction of the network within this shed will occur as development progresses. Interim facilities for conveying the effluent from the South Manteca Collection Area include:

1. The existing 12-inch and 18-inch Woodward Force Main (WFM) which extends from the Woodward Park Pump Station to the WQCF.

2. The existing Tara Park Pump Station and Airport-Daniel Lift Station that connects to the WFM. Eventually, the trunk sewer network in Woodward Avenue and beyond to the WQCF will be completed.

3. The existing Antigua Way Lift Station and existing Bella Vista Lift Station. Eventually, effluent from these two facilities will be re-pumped by the Terra Park Pump Station to the WFM.

The following existing sanitary sewer facilities have been constructed in Woodward Avenue:

1. An existing 30-inch diameter gravity sanitary sewer line extending from Atherton Drive west to South Main Street.

2. An existing 12-inch diameter sanitary sewer force main extending from South Main Street west to McKinley Avenue.

Storm Drainage: As shown in Figures 11a, 11b, 12a, and 12b, development of the proposed Project would include construction of a new storm drainage system, including a drainage collection system, storm drain pump stations, and detention basins. It is noted that the locations of the proposed detention basins are conceptual. Stormwater resulting from the future HDR portion of the Project would be diverted to the Oakwood Trails Subdivision storm drainage system, which will be developed adjacent west of the Project site in the future.

Installation of the Project's storm drainage system will be subject to current City of Manteca Design Specifications and Standards. The proposed storm drainage collection and detention system will be subject to the State Water Resources Control Board Requirements (SWRCB) and City of Manteca regulations, including: Manteca Storm Drain Master Plan, 2013; Phase II, National Pollutant Discharge Elimination System (NPDES) Permit Requirements; NPDES-MS4 Permit Requirements; and LID Guidelines.

Stormwater quality standards imposed and monitored by the Environmental Protection Agency (EPA) and the SWRCB through the City's NPDES permit require treatment of stormwater runoff prior to its release into natural drainage features or dual use South San Joaquin Irrigation District

(SSJID) and City Laterals. Stormwater quality is an integral part of the City's stormwater management system. Most existing stormwater is pumped into the dual use SSJID and City laterals and drains.

The City requires detention basins to help attenuate peak flows before drainage discharge is pumped into SSJID's facilities. Delaying the release of water over longer periods of time further reduces the potential of downstream flooding. The proposed detention basins are joint-use facilities providing recreation and other uses when not being used for stormwater detention.

Regulated Public Utilities: Electrical, gas, phone, cable and related internet services would be extended to all portions of the Project site from existing facilities located along Woodward Avenue, McKinley Avenue, Bronzan Road, Atherton Drive, or other utility systems in the Project site. Proposed utilities would be located within public utility easements to be dedicated along street frontages. Utility improvements would be installed in conjunction with planned street improvements.

5. Uses of the EIR and Required Agency Approvals

This EIR may be used for the following direct and indirect approvals and permits associated with adoption and implementation of the proposed Project.

A. City of Manteca

The City of Manteca will be the Lead Agency for the proposed Project, pursuant to the State Guidelines for Implementation of CEQA, Section 15050. Actions that would be required from the City include, but are not limited to the following:

- Certification of the EIR;
- Adoption of the Mitigation Monitoring and Reporting Program;
- Approval of City of Manteca General Plan Amendment (Land Use Element);
- Approval of City of Manteca Zoning Amendment;
- Approval of Improvement Plans;
- Approval of Grading Plans;
- Approval of Building Permits;
- Approval of future site plan and design review;
- Approval of future tentative and final map(s);
- Issuance of grading, encroachment, and building permits;
- City review and approval of Project utility plans;
- Formation of a finance district (i.e. Community Facilities District [CFD] or other finance district); and
- Formation of, or annexation into, a CFD.

B. Other Governmental Agency Approvals

The following agencies may be required to issue permits or approve certain aspects of the proposed Project. Other governmental agencies that may require approval include, but are not limited to, the following:

- Central Valley Regional Water Quality Control Board (CVRWQCB) - Storm Water Pollution Prevention Plan (SWPPP) approval prior to construction activities pursuant to the Clean Water Act;
- San Joaquin Valley Air Pollution Control District (SJVAPCD) - Approval of construction-related air quality permits;
- SJVAPCD - Authority to Construct, Permit to Operate for stationary sources of air pollution; and
- SJCOG, Inc. (SJCOG) - Issuance of incidental take permit under the San Joaquin Multi-Species Habitat Conservation and Open Space Plan (SJMSCP).

6. Project Alternatives

The exact alternatives that will be evaluated in the Draft EIR will be determined through the Notice of Preparation and Scoping Process. Through preliminary discussions, there are three alternatives to the proposed Project that are being contemplated for evaluation in the Draft EIR. These include the following:

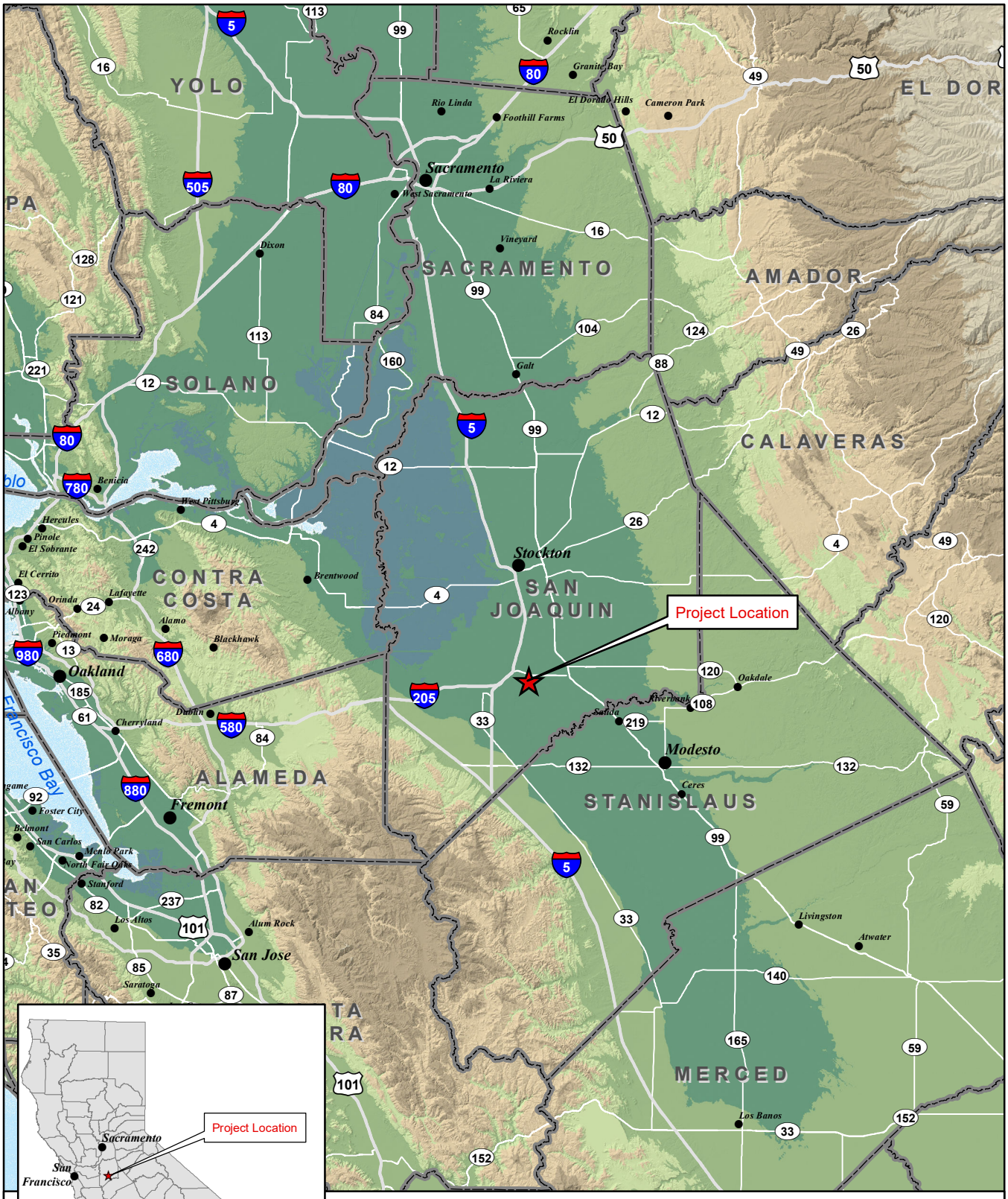
- **No Project (No Build) Alternative**: Under this alternative, development of the Project site would not occur, and the Project site would remain in its current existing condition.

- **Increased Density Alternative:** Under this alternative, the proposed Project would be developed with the same amenities as described in the Project Description, but the density of the residential uses would be increased.

- **Agriculture Protection Alternative:** Under this alternative, the proposed Project would be developed in such a way to protect those lands currently identified as prime farmland and farmland of statewide importance, by reducing the overall footprint of the developed areas to a greater extent than the reduced Project alternative.

Areas of Potential Impacts: All environmental topics identified in Appendix G of the State CEQA Guidelines require analysis within an EIR. The Draft EIR will examine the following: Aesthetics, Agricultural and Forest Resources, Air Quality, Biological Resources, Cultural Resources, Geology/Soils, Greenhouse Gases/Climate Change, Hazards and Hazardous Materials, Hydrology/Water Quality, Land Use/Planning, Mineral Resources, Noise, Population/Housing, Public Services, Recreation, Transportation/Circulation, Utilities, Cumulative Impacts, and Growth Inducing Impacts.

Initial Study: An Initial Study has not been prepared for this Project. As noted above, each environmental topic identified in Appendix G of the State CEQA Guidelines requires analysis in an EIR.

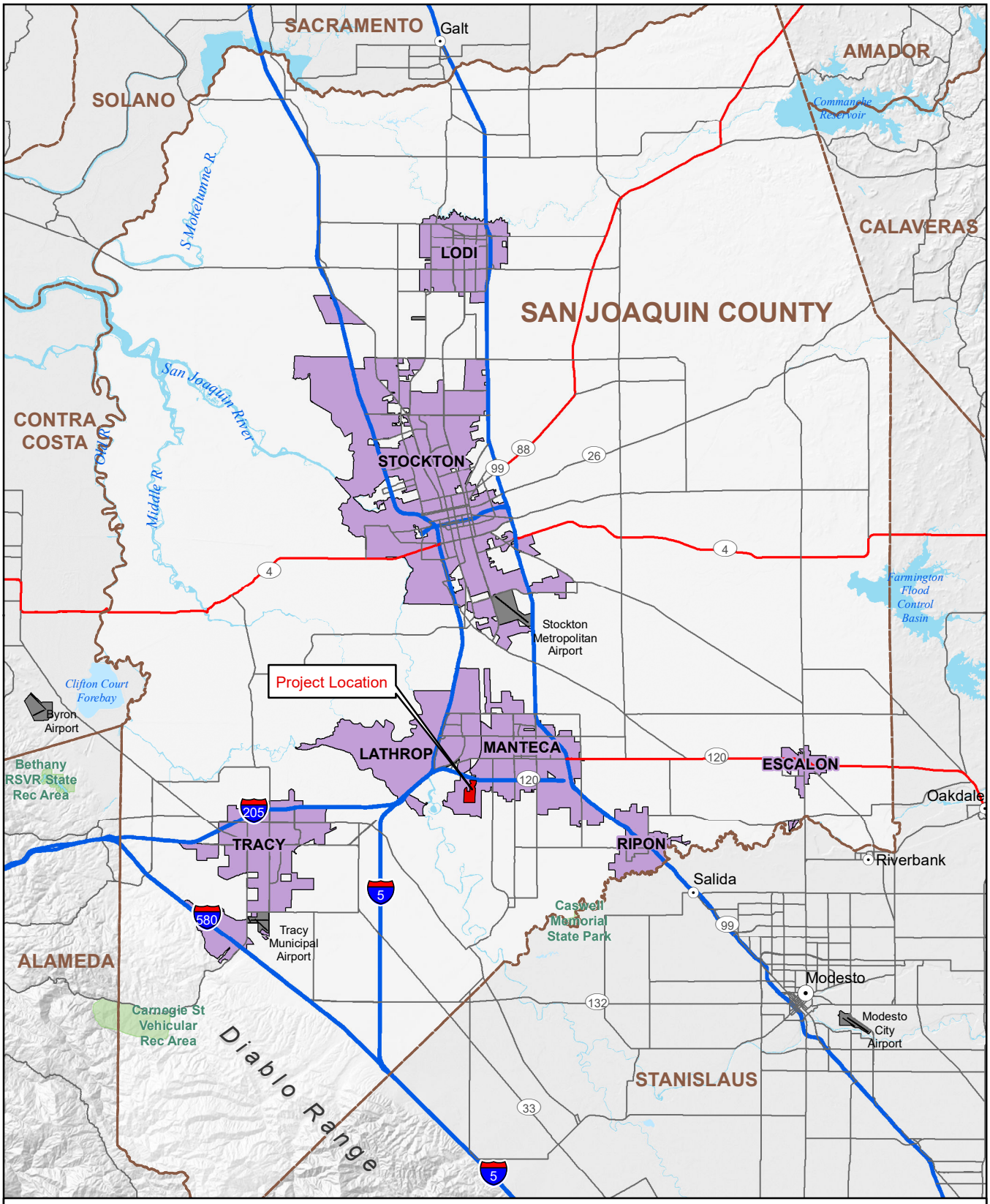


OAKWOOD LANDING

Figure 1: Regional Location Map

Sources: CalAtlas. Map date: July 13, 2016.

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OAKWOOD LANDING

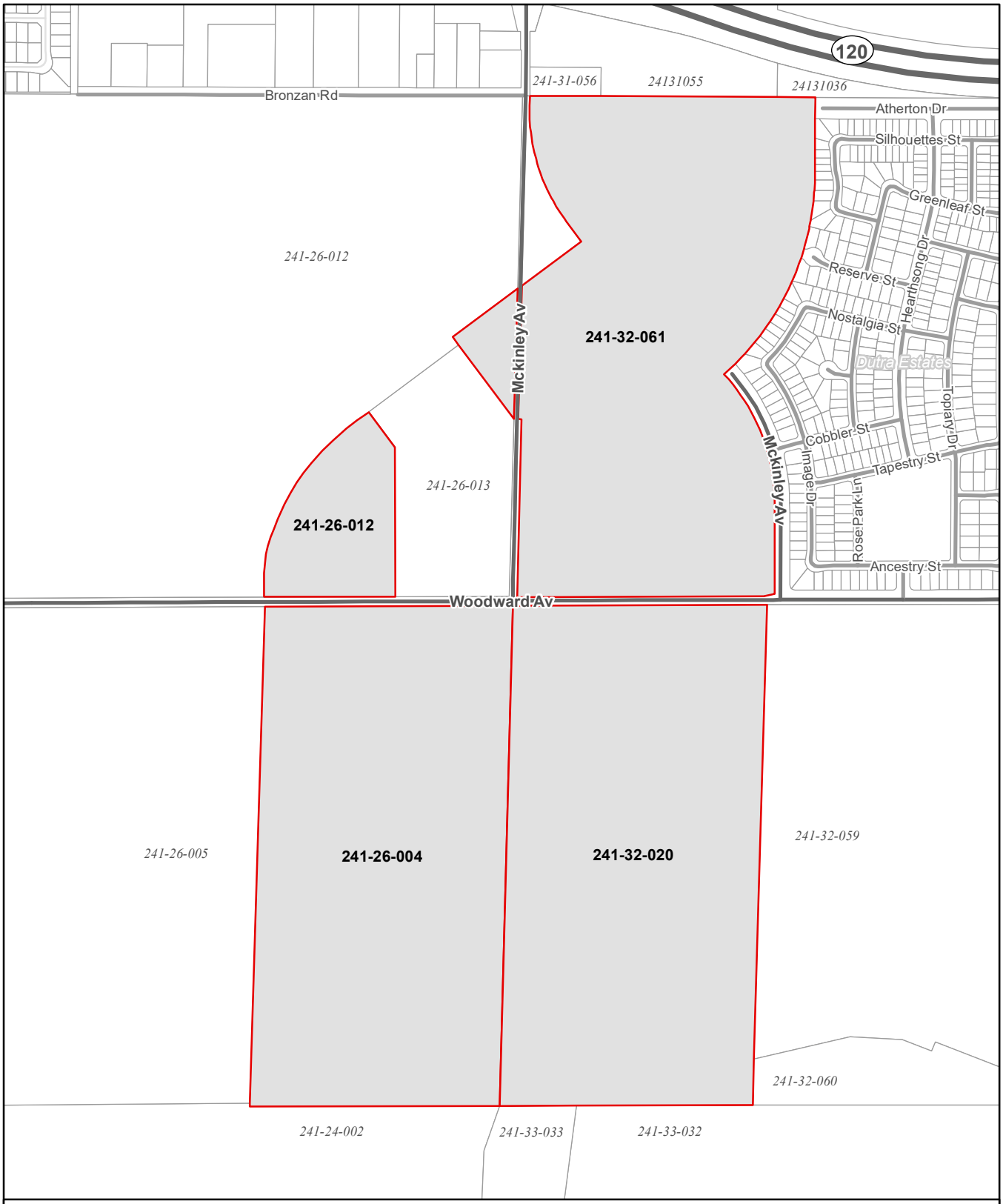
Figure 2: Project Vicinity Map

Legend

- Project Area
- Cities within San Joaquin County

Data sources: CalAtlas; ESRI StreetMap North America; San Joaquin County GIS. Map date: July 13, 2016.

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OAKWOOD LANDING

Figure 3: Assessor's Parcel Map

Legend

Project Parcels

N

0 250 500

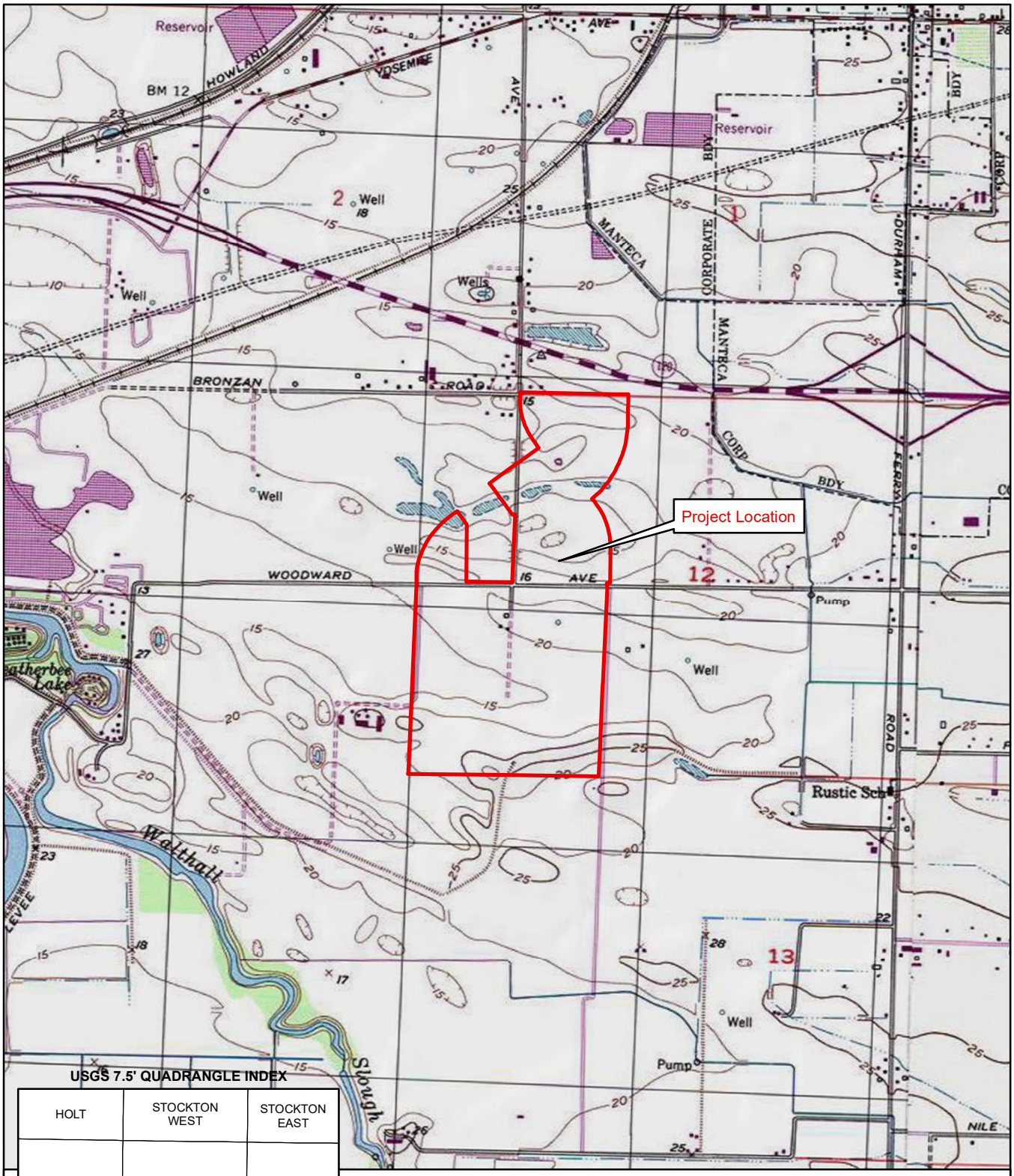
Feet

1:9,000

Sources: San Joaquin County GIS Parcels boundary layer, April 2016; ArcGIS Online Imagery Map Service. Map date: July 13, 2016.

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USGS 7.5' QUADRANGLE INDEX

HOLT	STOCKTON WEST	STOCKTON EAST
UNION ISLAND	LATHROP	MANTECA
TRACY	VERNALIS	RIPON

0 500 1,000
Feet
1:24,000

OAKWOOD LANDING

Figure 4: USGS Topographic Map

Lathrop Quadrangle

Data sources: San Joaquin County GIS; ArcGIS Online USGS Topographic Map Service. Map date:July 13, 2016.

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OAKWOOD LANDING

Figure 5: Aerial View of Project Site

Legend

Project Boundary

N

0 375 750

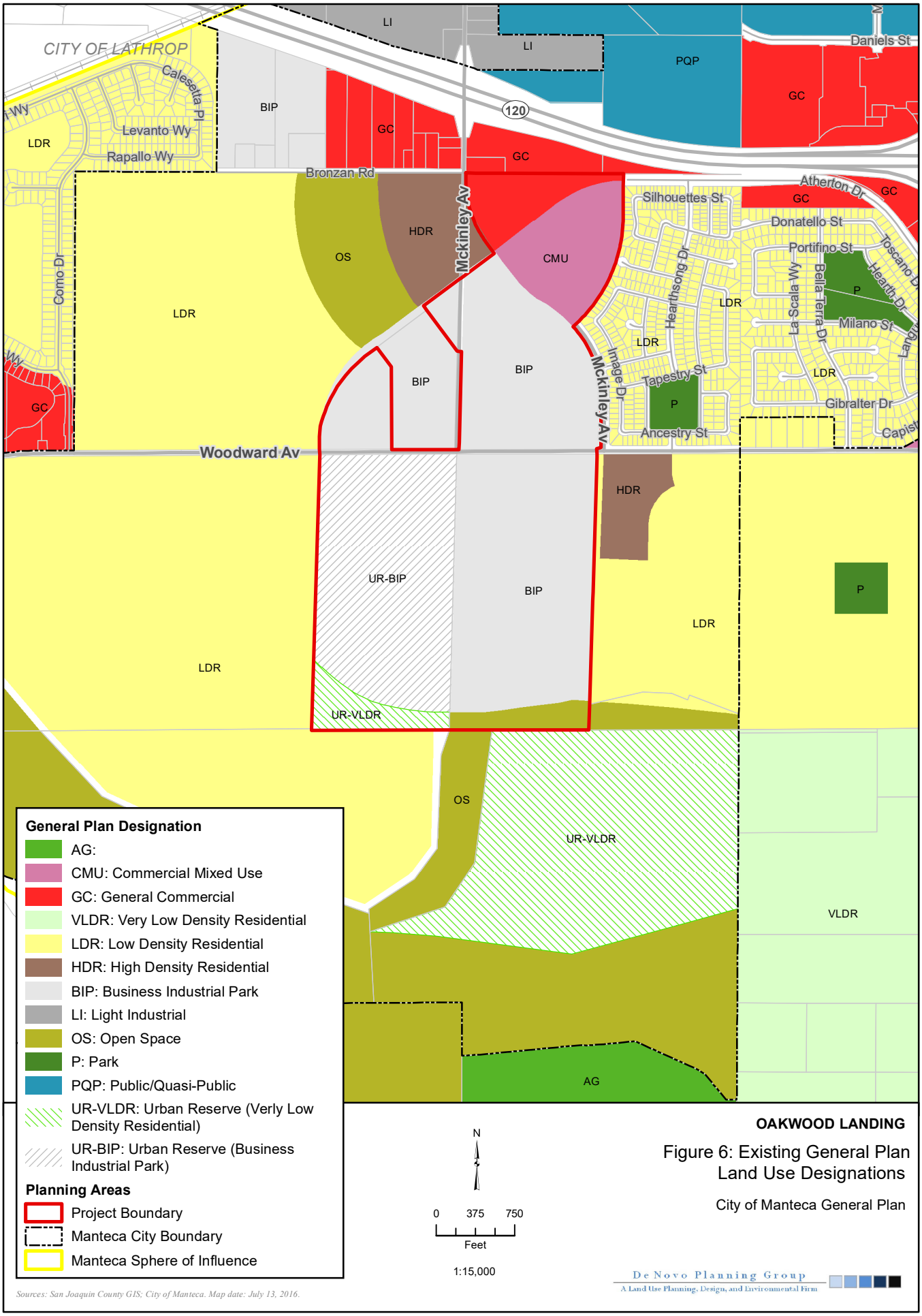
Feet

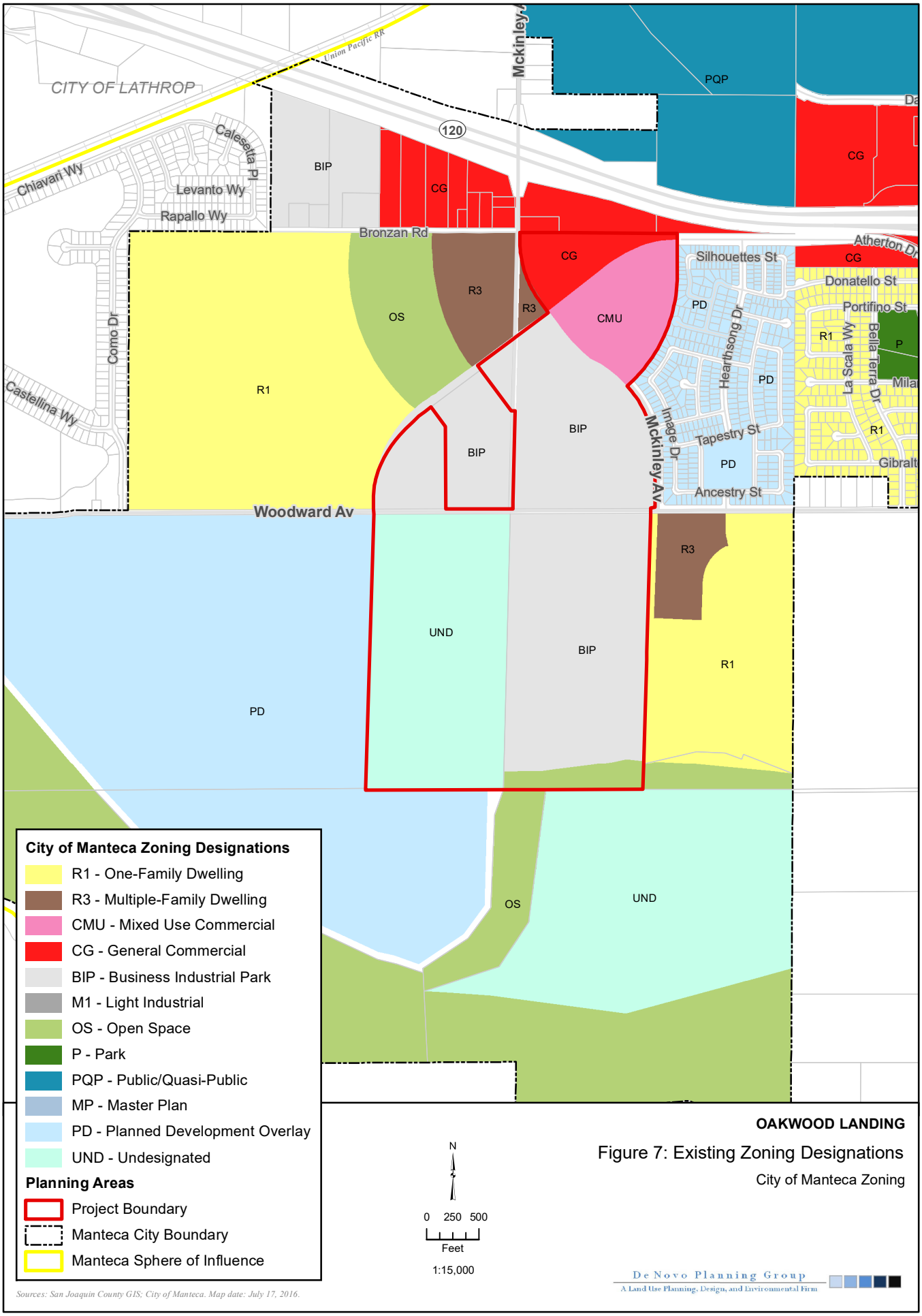
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Sources: San Joaquin County GIS; ArcGIS Online Imagery Map Service. Map date: July 13, 2016.

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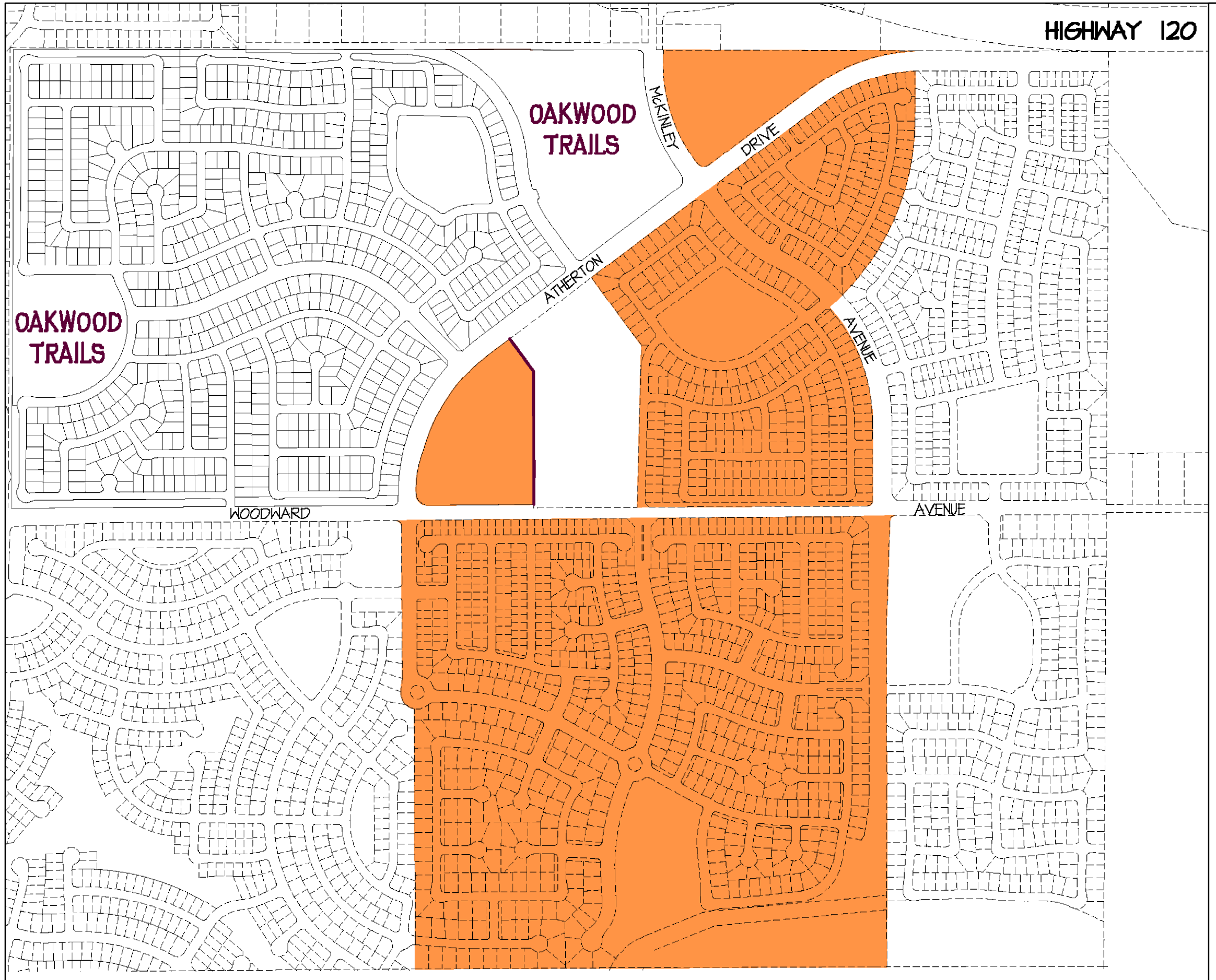

CITY OF LATHROP
LI
LI
PQP
Daniels St
GC
120
BIP
GC
GC
Calesetta Pl
Levanto Wy
Rapallo Wy
LDR
Bronzan Rd
Atherton Dr
GC
Silhouettes St
Donatello St
Portifino St
HDR
OS
Mckinley Av
CMU
Como Dr
LDR
Hearthsong Dr
LDR
La Scala Wy
Bella Terra Dr
P
Hearth Dr
Milano St
LDR
Image Dr
Tapestry St
LDR
BIP
BIP
Mckinley Av
P
Gibralter Dr
GC
Ancestry St
Woodward Av
HDR
UR-BIP
BIP
P
LDR
LDR
LDR
UR-VLDR
OS
UR-VLDR
VLDR
AG
General Plan Designation
AG:
CMU: Commercial Mixed Use
GC: General Commercial
VLDR: Very Low Density Residential
LDR: Low Density Residential
HDR: High Density Residential
BIP: Business Industrial Park
LI: Light Industrial
OS: Open Space
P: Park
PQP: Public/Quasi-Public
UR-VLDR: Urban Reserve (Verly Low Density Residential)
UR-BIP: Urban Reserve (Business Industrial Park)
Planning Areas
Project Boundary
Manteca City Boundary
Manteca Sphere of Influence
N
0
375
750
Feet
1:15,000
OAKWOOD LANDING
Figure 6: Existing General Plan Land Use Designations
City of Manteca General Plan
Sources: San Joaquin County GIS; City of Manteca. Map date: July 13, 2016.
De Novo Planning Group
A Land Use Planning, Design, and Environmental Firm



OAKWOOD LANDING

Figure 7: Existing Zoning Designations

City of Manteca Zoning



OAKWOOD LANDING

Figure 8a:
Oakwood Landing Site Plan

Legend

Properties within the EIR of Oakwood Landing

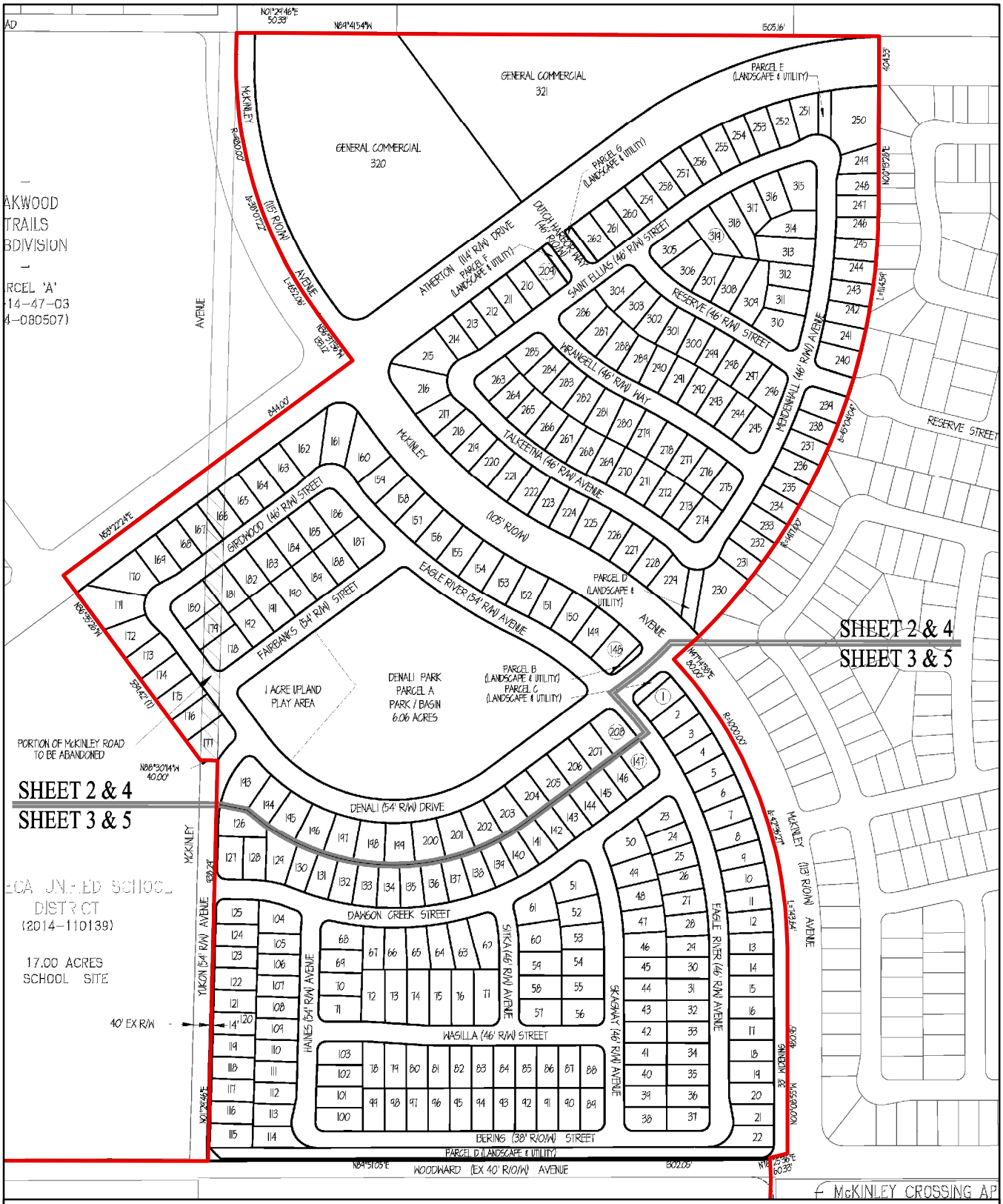
N

0 250 500
Feet

1:7,000

Sources: RLC Associates, July 11, 2016: Properties within the E.I.R. of Oakwood Landing. Map date: July 13, 2016.

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Legend

Project Boundary

N

0 100 200

Feet

1:4,000

OAKWOOD LANDING

Figure 8b: Denali Subdivsion Tentative Map

Sources: Vesting Tentative Map Denali Tract No. 3845, RLC Associates, December 10, 2015, updated February 29, 2016; San Joaquin County GIS. Map date: July 13, 2016.

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Legend

Project Boundary

N

0 100 200

Feet

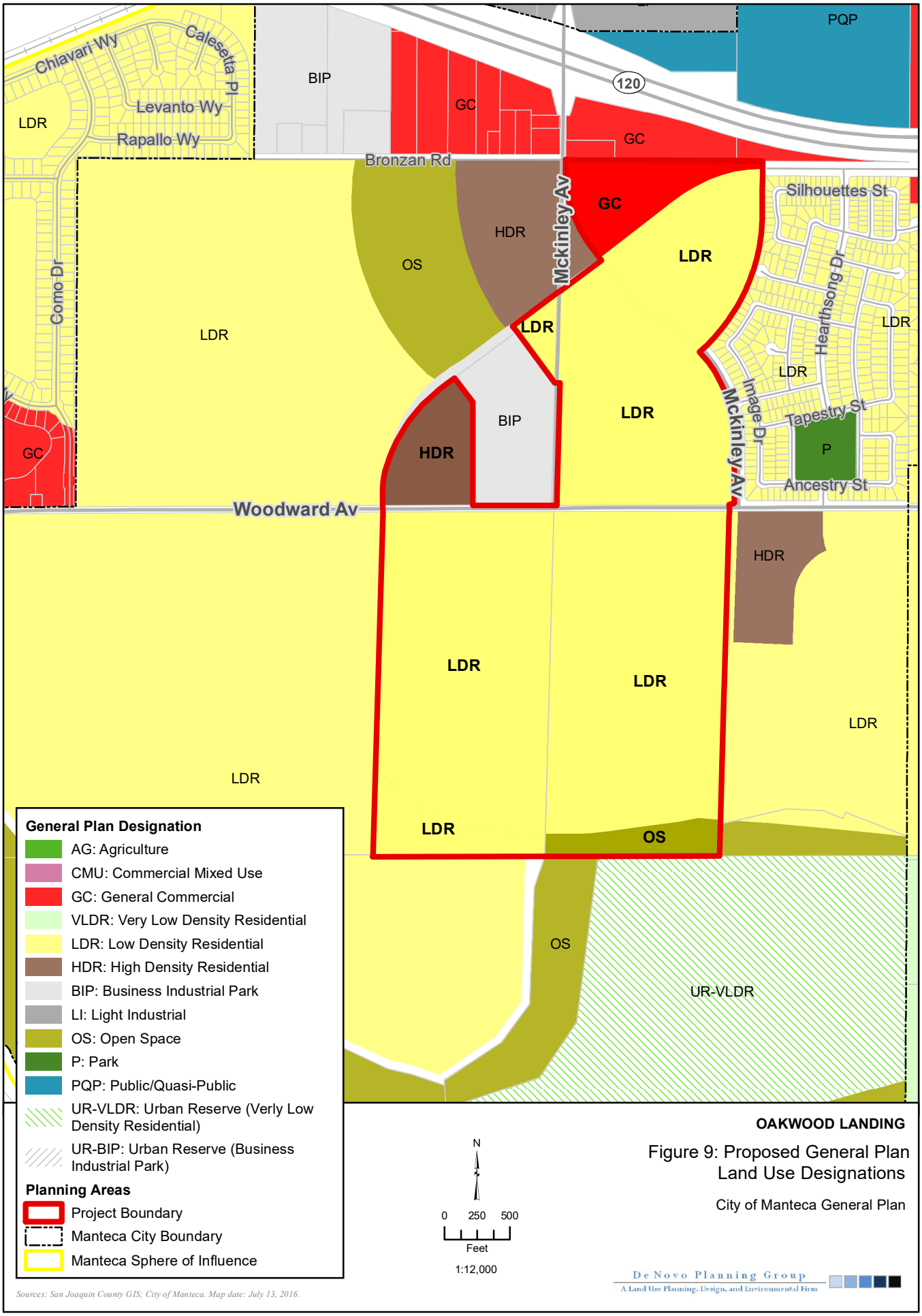
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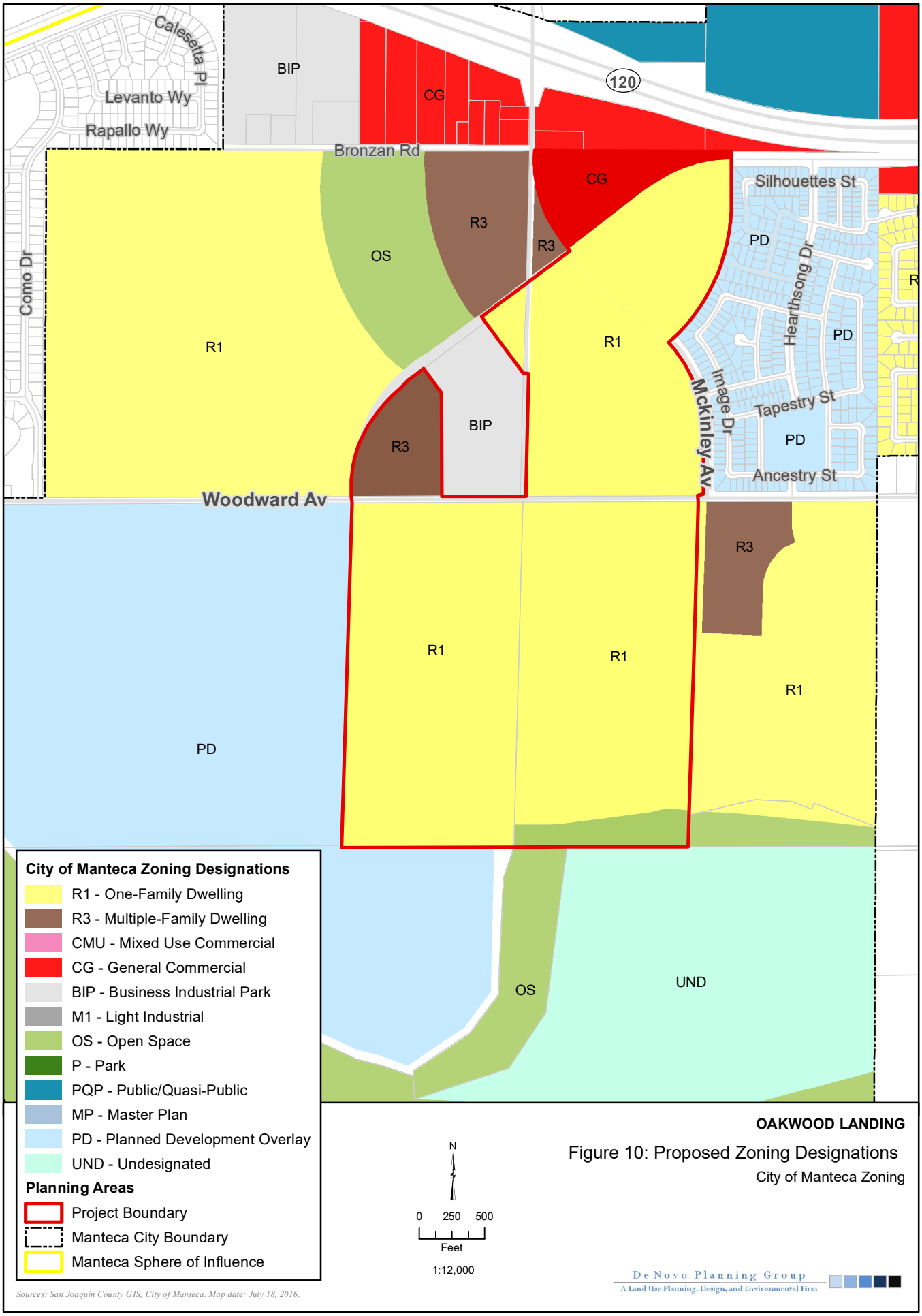
OAKWOOD LANDING

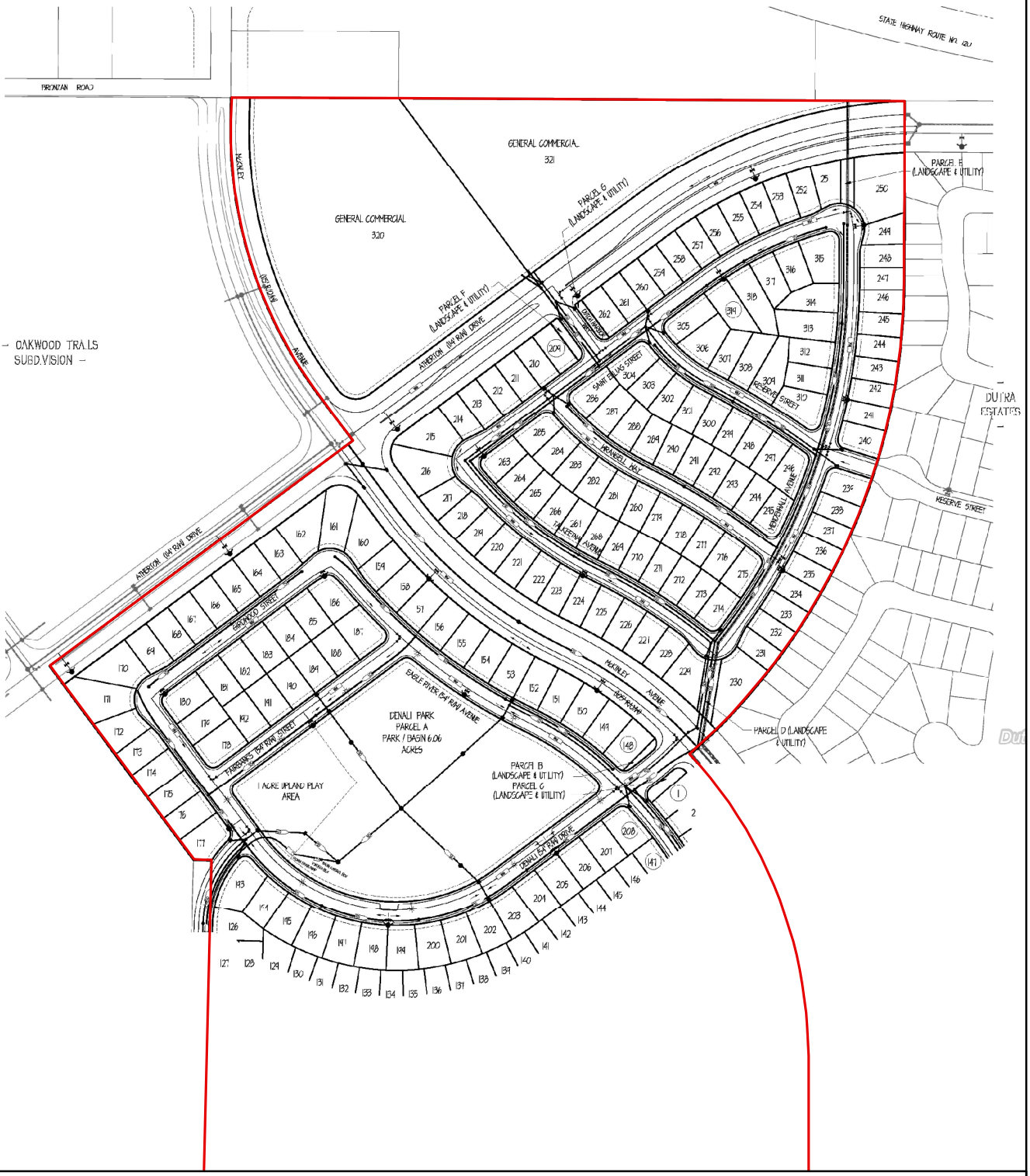
Figure 8c: Cerri Subdivsion Tentative Map

Sources: Cerri Residential Subdivision, Tentative Subdivision Map, Manteca, California, Northstar Engineering Group, July 12, 2016. San Joaquin County GIS. Map date: July 13, 2016.

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Chiavari Wy
Calesetta Pl
Levanto Wy
Rapallo Wy
LDR
BIP
GC
120
PQP
Bronzan Rd
Como Dr
LDR
OS
HDR
Mckinley Av
GC
LDR
Silhouettes St
Hearthsong Dr
LDR
LDR
Image Dr
Tapestry St
P
Ancestry St
Mckinley Av
LDR
BIP
HDR
GC
Woodward Av
HDR
LDR
LDR
LDR
LDR
LDR
LDR
OS
OS
UR-VLDR
General Plan Designation
AG: Agriculture
CMU: Commercial Mixed Use
GC: General Commercial
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LDR: Low Density Residential
HDR: High Density Residential
BIP: Business Industrial Park
LI: Light Industrial
OS: Open Space
P: Park
PQP: Public/Quasi-Public
UR-VLDR: Urban Reserve (Verly Low Density Residential)
UR-BIP: Urban Reserve (Business Industrial Park)
Planning Areas
Project Boundary
Manteca City Boundary
Manteca Sphere of Influence
N
0 250 500
Feet
1:12,000
Sources: San Joaquin County GIS; City of Manteca. Map date: July 13, 2016.
OAKWOOD LANDING
Figure 9: Proposed General Plan Land Use Designations
City of Manteca General Plan
De Novo Planning Group
A Land Use Planning, Design, and Environmental Firm


Calesetta Pl
Levanto Wy
Rapallo Wy
BIP
CG
120
Bronzan Rd
CG
Silhouettes St
R3
OS
R3
PD
Como Dr
Hearthsong Dr
PD
R1
R1
Image Dr
Tapestry St
BIP
R3
PD
Mckinley Av
Ancestry St
Woodward Av
R3
R1
R1
R1
PD
OS
UND
City of Manteca Zoning Designations
R1 - One-Family Dwelling
R3 - Multiple-Family Dwelling
CMU - Mixed Use Commercial
CG - General Commercial
BIP - Business Industrial Park
M1 - Light Industrial
OS - Open Space
P - Park
PQP - Public/Quasi-Public
MP - Master Plan
PD - Planned Development Overlay
UND - Undesignated
Planning Areas
Project Boundary
Manteca City Boundary
Manteca Sphere of Influence
N
0 250 500
Feet
1:12,000
Sources: San Joaquin County GIS; City of Manteca. Map date: July 18, 2016.
OAKWOOD LANDING
Figure 10: Proposed Zoning Designations
City of Manteca Zoning
De Novo Planning Group
A Land Use Planning, Design, and Environmental Firm



OAKWOOD LANDING

Figure 11a: Proposed Utility Plan
Denali Subdivision (North)

Legend

Project Boundary

N

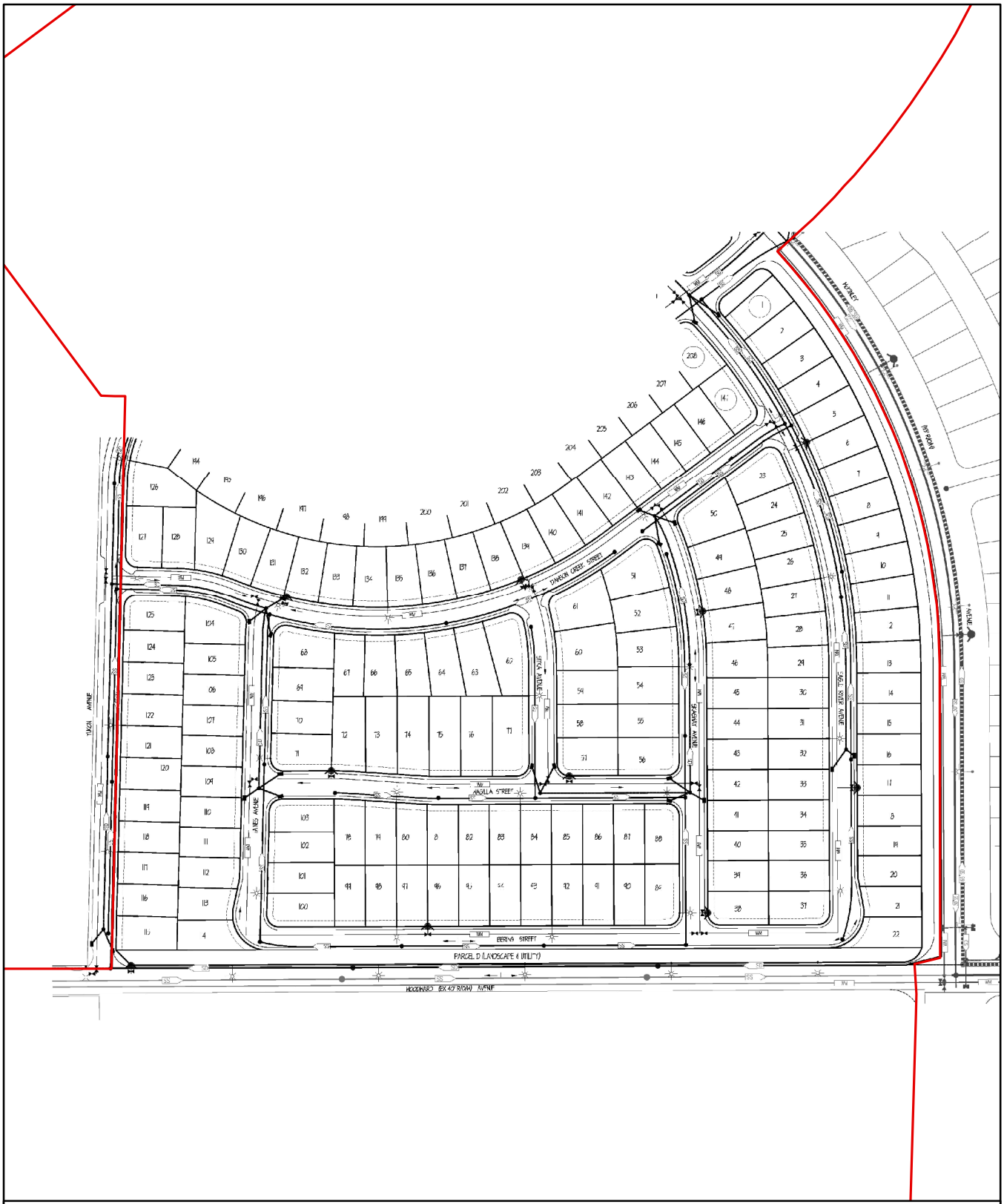
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Feet

1:4,000

Sources: San Joaquin County GIS; RLC Associates, February 29, 2016. Map date: July 18, 2016.

De Novo Planning Group
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PARCEL D (LANDSCAPE & UTILITY)
HOGGINS (EX 40' R/O/W) AVENUE
AGUILA STREET
SEQUOIA AVENUE
DAKOTA AVENUE
DAKOTA AVENUE
DAKOT



OAKWOOD LANDING

Figure 12a: Proposed Utility Plan
Cerri Subdivision (North)

Legend

Project Boundary

N

0 100 200

Feet

1:4,600

Sources: San Joaquin County GIS; NorthStar Engineering Group, July 12, 2016. Map date: July 18, 2016.

De Novo Planning Group
A Land Use Planning, Design, and Environmental Firm



Legend

Project Boundary

N

0 100 200

Feet

1:3,600

OAKWOOD LANDING

Figure 12b: Proposed Utility Plan
Cerri Subdivision (South)

Sources: San Joaquin County GIS; NorthStar Engineering Group, July 12, 2016. Map date: July 18, 2016.

De Novo Planning Group
A Land Use Planning, Design, and Environmental Firm

From: Swearingen, Joshua B@DOT
To: rhenson@ci.manteca.ca.us
Cc: state.clearinghouse@opr.ca.gov; Jaramillo-Landeros, Janet P@DOT
Subject: SCH 2016082046 - Oakwood Landing-Denali Subdivision
Date: Tuesday, September 13, 2016 11:22:22 AM

Ms. Henson,

The California Department of Transportation (Department) appreciates the opportunity to review and comment on SCH No. 2016082046 – Oakwood Landing-Denali Subdivision (Project). The project includes up to 290 high density residential units, 975 low density residential units, 237,838 SF of commercial uses, 16.06 acres of park uses, 6.77 acres of open space, and comprises a total of 258.29 acres of land. The project would require a General Plan Amendment to change approx. 121.67 acres of BIP to LDR uses; change approx. 70 acres of UR-BIP to LDR uses; change approx. 9.39 acres of UR-VLDR to LDR uses; change approx. 23.41 acres of CMU to LDR uses; change approx. 11.59 acres of BIP to HDR uses; maintain approx. 13.0 acres as GC; and maintain approx. 6.77 acres of OS. The project would require a rezone of the entire project site to a One-Family Dwelling Zoning District (R-1), Multiple Family Dwelling (R-3), GC, and OS. The Department has the following comments:

1. The proposed Oakwood Landing will result in potential significant impacts to SR-120/Airport Way interchange, I-5/SR-120 connector, I-5/Louise Ave interchange, SR-99/Austin Road and mainline segments of I-5 and SR-120. A Traffic Impact Study (TIS) should be completed to determine the proposed project's near-term and long-term impacts to State highway facilities. The TIS should be in accordance with "Caltrans Guide for the Preparation of TIS" dated December 2002 and include a discussion of identified mitigation measures/improvements and funding responsibility.

2. The TIS scenarios and respective travel forecasts should include all approved and pending projects within the vicinity. The TIS should also include the approved and pending projects in its analysis scenarios. To omit the currently approved and pending projects would result in an inadequate EIR/TIS analysis.

3. The TIS study boundary area should encompass all potentially impacted interchanges and freeway segments. The following interchanges, ramp intersections, and freeway segments should be evaluated:

    - SR-120/Airport Way
    - SR-120/McKinley Ave (Future)
    - I-5/Louise Ave
    - SR-99/Austin Road
    - SR-120 between I-5/SR-120 connector and Guthmiller Road
    - SR-120 between Guthmiller Road and Airport Way
    - SR-120 between Airport Way and Union Road
    - SR-120 between Airport Way and McKinley Ave (Future)
    - SR-120 between McKinley Ave and Guthmiller Road (Future)
    - I-5 (one mile south of SR-120)

- I-5 (one mile north of SR-120)

4. Dependent on trip distribution, in addition to the above locations (listed in comment 3), include any project proposed access, or other affected intersections and road segments if the project generated traffic has the potential to significantly affect those highway facilities. Select link and select zone analyses should be performed to determine if the study boundary needs to be adjusted.

5. If there are closely spaced intersections at interchange ramp junctions, and intersections, which result in any queue interaction, the intersection operational analyses should be performed using micro-simulation such as SimTraffic V 8.0. In these situations attempting to analyze intersections at interchanges using Highway Capacity Manual 2010 methodology would be inappropriate since the methodology assumes isolated intersections and ignores queue effects and will result in underestimated impacts. The intersection LOS analysis in addition to the intersection average LOS, needs to consider the LOS of the individual approaches and movements.

6. The methodology for analysis of un-signalized intersections is to be done using HCM. However if queue blocking or other characteristics are involved beyond the HCM constraints, then micro-simulation may need to be performed.

7. The methodologies for computing mainline operations, merge/diverge analysis will be as provided in the Transportation Research Board's (TRB) publication, Highway Capacity Manual 2010. Mainline and merge/diverge computations will be made using the "Highway Capacity Software" published by TRB and based on the referenced publication.

8. The methodologies for weaving analysis are to be addressed as per the methodology shown in the Caltrans Highway Design Manual, Sixth Edition.

9. Ramp metering analysis should include in the TIS of the proposed project. Ramp meter storage should be calculated using the following parameters:

    - Use design year unconstrained volumes
    - HOV preferential lane used by 11 percent of volume
    - Accommodate storage for 7 percent of non-HOV volume assuming 30 feet per vehicle

10. The existing SR-120/Airport Way interchange is not STAA approved. According to the NOP, the proposed project includes one business industrial park area and one general commercial area that will generate amount of truck traffic using this interchange. This will result in potential significant impact due to creating a safety issue. The TIS needs to analyze the STAA off-tracking analysis and provide improvements. Additionally, the TIS needs to analyze the STAA off-tracking analysis at any interchange intersections that STAA truck uses to access to the proposed project site.

11. Traffic analysis will use current traffic volumes to determine the existing conditions. The analysis will need to identify the impacts under the following scenarios:

    • Existing condition (Existing Conditions Plus other Approved and Pending Projects)
    • Opening year (Near-Term) with and without Project conditions plus other Approved and Pending Projects
    • Opening year for the various Phases with and without Project plus other Approved and Pending Projects
    • Cumulative Conditions with and without Project

12. The various traffic study scenarios (as listed in comment 11) will need to fully analyze the impacts to signalized intersections, merge/diverge, mainline analysis, etc. The DEIR must not ignore areas of analysis such as intersections analysis and merge/diverge analysis in the Cumulative scenarios to avoid having to disclose potential significant impacts.

13. Project-specific and cumulative traffic impacts on interstate and state routes will be based on Caltrans threshold and improvements required to mitigate impacts will be outlined. Intersection analysis will include delay, average LOS, individual movement LOS, 95th percentile queue, left-turn/right-turn lane storage requirements, sight distance, traffic control device warrants (signal control).

14. The TIS should address the proposed mitigation measures in relation to the future improvement projects by Caltrans and the City of Manteca.

15. Given the importance of mobility options, the project should provide an assessment of how various transportation options will be incorporated into the site. Specifically, pedestrian and bicycle access to and through the subject site should be provided, and Transportation Demand Management strategies such as carpool and vanpool formation with parking opportunities should be provided. The manner in which land is developed can have a profound effect on the viability of alternative transportation options. Compact, mixed-use "village" centers designed at a human (pedestrian / bicycle) scale enable residents and visitors to achieve a high level of mobility. The Department encourages the applicant to incorporate design features and site proximities that encourage walking and bicycling, vastly expanded public transit options, accessibility for children, the elderly, and persons with disabilities, and transit priority measures to make travel times competitive with the automobile.

The Department suggests that the City of Manteca continue to coordinate and consult with the Department to identify and address potential cumulative transportation impacts that may occur from this project and other developments near this geographical location. This will assist us in ensuring that traffic safety and quality standards are maintained for the traveling public on existing and future state transportation facilities.

If you have any questions or comments please contact me.

Thank you,

Joshua Swearingen
Associate Transportation Planner
Caltrans District 10
(209) 948-7142

California Water Boards

Edmund G. Brown Jr.
Governor

Matthew Rodriquez
Secretary for
Environmental Protection

Central Valley Regional Water Quality Control Board

RECEIVED
SEP 13 2016
COMMUNITY DEVELOPMENT
DEPARTMENT

8 September 2016

CERTIFIED MAIL
91 7199 9991 7035 8360 9638

Rochelle Henson
City of Manteca
1001 West Center Street
Manteca, CA 95337

COMMENTS TO REQUEST FOR REVIEW FOR THE NOTICE OF PREPARATION FOR THE DRAFT ENVIRONMENTAL IMPACT REPORT, OAKWOOD LANDING – CERRI & DENALI SUBDIVISIONS PROJECT, SCH# 2016082046, SAN JOAQUIN COUNTY

Pursuant to the State Clearinghouse's 18 August 2016 request, the Central Valley Regional Water Quality Control Board (Central Valley Water Board) has reviewed the *Request for Review for the Notice of Preparation for the Draft Environment Impact Report* for the Oakwood Landing – Cerri & Denali Subdivisions Project, located in San Joaquin County.

Our agency is delegated with the responsibility of protecting the quality of surface and groundwaters of the state; therefore our comments will address concerns surrounding those issues.

I. Regulatory Setting

Basin Plan

The Central Valley Water Board is required to formulate and adopt Basin Plans for all areas within the Central Valley region under Section 13240 of the Porter-Cologne Water Quality Control Act. Each Basin Plan must contain water quality objectives to ensure the reasonable protection of beneficial uses, as well as a program of implementation for achieving water quality objectives with the Basin Plans. Federal regulations require each state to adopt water quality standards to protect the public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act. In California, the beneficial uses, water quality objectives, and the Antidegradation Policy are the State's water quality standards. Water quality standards are also contained in the National Toxics Rule, 40 CFR Section 131.36, and the California Toxics Rule, 40 CFR Section 131.38.

The Basin Plan is subject to modification as necessary, considering applicable laws, policies, technologies, water quality conditions and priorities. The original Basin Plans were adopted in 1975, and have been updated and revised periodically as required, using Basin Plan amendments. Once the Central Valley Water Board has adopted a Basin Plan amendment in noticed public hearings, it must be approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law (OAL) and in some cases,

the United States Environmental Protection Agency (USEPA). Basin Plan amendments only become effective after they have been approved by the OAL and in some cases, the USEPA. Every three (3) years, a review of the Basin Plan is completed that assesses the appropriateness of existing standards and evaluates and prioritizes Basin Planning issues.

For more information on the *Water Quality Control Plan for the Sacramento and San Joaquin River Basins*, please visit our website:
http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/.

Antidegradation Considerations

All wastewater discharges must comply with the Antidegradation Policy (State Water Board Resolution 68-16) and the Antidegradation Implementation Policy contained in the Basin Plan. The Antidegradation Policy is available on page IV-15.01 at:
http://www.waterboards.ca.gov/centralvalleywater_issues/basin_plans/sacsjr.pdf

In part it states:

> *Any discharge of waste to high quality waters must apply best practicable treatment or control not only to prevent a condition of pollution or nuisance from occurring, but also to maintain the highest water quality possible consistent with the maximum benefit to the people of the State.*
>
> *This information must be presented as an analysis of the impacts and potential impacts of the discharge on water quality, as measured by background concentrations and applicable water quality objectives.*

The antidegradation analysis is a mandatory element in the National Pollutant Discharge Elimination System and land discharge Waste Discharge Requirements (WDRs) permitting processes. The environmental review document should evaluate potential impacts to both surface and groundwater quality.

II. Permitting Requirements

Construction Storm Water General Permit

Dischargers whose project disturb one or more acres of soil or where projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres, are required to obtain coverage under the General Permit for Storm Water Discharges Associated with Construction Activities (Construction General Permit), Construction General Permit Order No. 2009-009-DWQ. Construction activity subject to this permit includes clearing, grading, grubbing, disturbances to the ground, such as stockpiling, or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan

(SWPPP).

For more information on the Construction General Permit, visit the State Water Resources Control Board website at:
http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml.

Phase I and II Municipal Separate Storm Sewer System (MS4) Permits[1]

The Phase I and II MS4 permits require the Permittees reduce pollutants and runoff flows from new development and redevelopment using Best Management Practices (BMPs) to the maximum extent practicable (MEP). MS4 Permittees have their own development standards, also known as Low Impact Development (LID)/post-construction standards that include a hydromodification component. The MS4 permits also require specific design concepts for LID/post-construction BMPs in the early stages of a project during the entitlement and CEQA process and the development plan review process.

For more information on which Phase I MS4 Permit this project applies to, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/water_issues/storm_water/municipal_permits/.

For more information on the Phase II MS4 permit and who it applies to, visit the State Water Resources Control Board at:
http://www.waterboards.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml

Industrial Storm Water General Permit

Storm water discharges associated with industrial sites must comply with the regulations contained in the Industrial Storm Water General Permit Order No. 2014-0057-DWQ.

For more information on the Industrial Storm Water General Permit, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/water_issues/storm_water/industrial_general_permits/index.shtml.

Clean Water Act Section 404 Permit

If the project will involve the discharge of dredged or fill material in navigable waters or wetlands, a permit pursuant to Section 404 of the Clean Water Act may be needed from the United States Army Corps of Engineers (USACOE). If a Section 404 permit is required by the USACOE, the Central Valley Water Board will review the permit application to ensure that discharge will not violate water quality standards. If the project requires surface water

[1] Municipal Permits = The Phase I Municipal Separate Storm Water System (MS4) Permit covers medium sized Municipalities (serving between 100,000 and 250,000 people) and large sized municipalities (serving over 250,000 people). The Phase II MS4 provides coverage for small municipalities, including non-traditional Small MS4s, which include military bases, public campuses, prisons and hospitals.

drainage realignment, the applicant is advised to contact the Department of Fish and Game for information on Streambed Alteration Permit requirements.

If you have any questions regarding the Clean Water Act Section 404 permits, please contact the Regulatory Division of the Sacramento District of USACOE at (916) 557-5250.

Clean Water Act Section 401 Permit – Water Quality Certification

If an USACOE permit (e.g., Non-Reporting Nationwide Permit, Nationwide Permit, Letter of Permission, Individual Permit, Regional General Permit, Programmatic General Permit), or any other federal permit (e.g., Section 10 of the Rivers and Harbors Act or Section 9 from the United States Coast Guard), is required for this project due to the disturbance of waters of the United States (such as streams and wetlands), then a Water Quality Certification must be obtained from the Central Valley Water Board prior to initiation of project activities. There are no waivers for 401 Water Quality Certifications.

Waste Discharge Requirements – Discharges to Waters of the State

If USACOE determines that only non-jurisdictional waters of the State (i.e., "non-federal" waters of the State) are present in the proposed project area, the proposed project may require a Waste Discharge Requirement (WDR) permit to be issued by Central Valley Water Board. Under the California Porter-Cologne Water Quality Control Act, discharges to all waters of the State, including all wetlands and other waters of the State including, but not limited to, isolated wetlands, are subject to State regulation.

For more information on the Water Quality Certification and WDR processes, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/help/business_help/permit2.shtml.

Dewatering Permit

If the proposed project includes construction or groundwater dewatering to be discharged to land, the proponent may apply for coverage under State Water Board General Water Quality Order (Low Risk General Order) 2003-0003 or the Central Valley Water Board's Waiver of Report of Waste Discharge and Waste Discharge Requirements (Low Risk Waiver) R5-2013-0145. Small temporary construction dewatering projects are projects that discharge groundwater to land from excavation activities or dewatering of underground utility vaults. Dischargers seeking coverage under the General Order or Waiver must file a Notice of Intent with the Central Valley Water Board prior to beginning discharge.

For more information regarding the Low Risk General Order and the application process, visit the Central Valley Water Board website at:

http://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2003/wqo/wqo2003-0003.pdf

For more information regarding the Low Risk Waiver and the application process, visit the Central Valley Water Board website at:

http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/waivers/r5-2013-0145_res.pdf

Regulatory Compliance for Commercially Irrigated Agriculture

If the property will be used for commercial irrigated agricultural, the discharger will be required to obtain regulatory coverage under the Irrigated Lands Regulatory Program. There are two options to comply:

1. **Obtain Coverage Under a Coalition Group.** Join the local Coalition Group that supports land owners with the implementation of the Irrigated Lands Regulatory Program. The Coalition Group conducts water quality monitoring and reporting to the Central Valley Water Board on behalf of its growers. The Coalition Groups charge an annual membership fee, which varies by Coalition Group. To find the Coalition Group in your area, visit the Central Valley Water Board's website at: http://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/app_approval/index.shtml; or contact water board staff at (916) 464-4611 or via email at IrrLands@waterboards.ca.gov.

2. **Obtain Coverage Under the General Waste Discharge Requirements for Individual Growers, General Order R5-2013-0100**. Dischargers not participating in a third-party group (Coalition) are regulated individually. Depending on the specific site conditions, growers may be required to monitor runoff from their property, install monitoring wells, and submit a notice of intent, farm plan, and other action plans regarding their actions to comply with their General Order. Yearly costs would include State administrative fees (for example, annual fees for farm sizes from 10-100 acres are currently $1,084 + $6.70/Acre); the cost to prepare annual monitoring reports; and water quality monitoring costs. To enroll as an Individual Discharger under the Irrigated Lands Regulatory Program, call the Central Valley Water Board phone line at (916) 464-4611 or e-mail board staff at IrrLands@waterboards.ca.gov.

Low or Limited Threat General NPDES Permit

If the proposed project includes construction dewatering and it is necessary to discharge the groundwater to waters of the United States, the proposed project will require coverage under a National Pollutant Discharge Elimination System (NPDES) permit. Dewatering discharges are typically considered a low or limited threat to water quality and may be covered under the General Order for *Dewatering and Other Low Threat Discharges to Surface Waters* (Low Threat General Order) or the General Order for *Limited Threat Discharges of Treated/Untreated Groundwater from Cleanup Sites, Wastewater from Superchlorination Projects, and Other Limited Threat Wastewaters to Surface Water* (Limited Threat General Order). A complete application must be submitted to the Central Valley Water Board to obtain coverage under these General NPDES permits.

For more information regarding the Low Threat General Order and the application process, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2013-0074.pdf

For more information regarding the Limited Threat General Order and the application process, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2013-0073.pdf

NPDES Permit

If the proposed project discharges waste that could affect the quality of the waters of the State, other than into a community sewer system, the proposed project will require coverage under a National Pollutant Discharge Elimination System (NPDES) permit. A complete Report of Waste Discharge must be submitted with the Central Valley Water Board to obtain a NPDES Permit.

For more information regarding the NPDES Permit and the application process, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/help/business_help/permit3.shtml

If you have questions regarding these comments, please contact me at (916) 464-4644 or Stephanie.Tadlock@waterboards.ca.gov.

Stephanie Tadlock

Stephanie Tadlock
Environmental Scientist

cc: State Clearinghouse unit, Governor's Office of Planning and Research, Sacramento

390 Towne Centre Drive, Lathrop, CA 95330
Community Development Department
(209) 941-7260, (209) 941-7268 fax

September 19, 2016

Rochelle Henson
Community Development Department
1001 West Center Street
Manteca, CA 95337

RE: NOTICE OF PREPARATION OF A DRAFT EIR FOR OAKWOOD LANDING PROJECT

Dear Ms. Henson,

The City of Lathrop appreciates the opportunity to comment on the NOP for a Draft EIR for the Oakwood Landing Project. The subject site is within the 200-year floodplain within the RD 17 Basin. There is a regional collaboration between RD 17 and the cities of Manteca, Lathrop, Stockton, and San Joaquin County to address the urban level flood protection needed pursuant to SB 5. RD 17 and the land use agencies have entered into a MOU to document their collaboration and cooperation to achieve an urban level of flood protection in this basin.

In addition, the cities of Manteca and Lathrop adopted Adequate Progress Findings to allow development to proceed while the efforts to achieve urban level of flood protection are underway. As part of the Draft EIR, please include information on the proposed project and its participation in the near term potential funding sources identified on page 11 of the Adequate Progress Findings (attached).

Should you have any questions or wish to discuss this request, please contact Rebecca Schmidt, Community Development Director, at (209) 941-7267 or rschmidt@ci.lathrop.ca.us. Thank you.

Respectfully,

RSchmidt

Rebecca Schmidt, AICP
Community Development Director
City of Lathrop

cc: Stephen Salvatore, City Manager
Glenn Gebhardt, City Engineer

Attachment: Adequate Progress Findings - Manteca

Exhibit A
Adequate Progress Findings[1]
Pursuant to California Government Code Sections 65865.5, 65962 and 66474.5

I. Introduction

The Central Valley Flood Protection Act of 2007, enacted by Senate Bill (SB) 5 in 2007 and amended by subsequent legislation (2007 California Flood Legislation) requires that jurisdictions located in the Sacramento-San Joaquin Valley consider amendments to the city or county's general plan regarding the provision of 200-year flood protection. Following the amendments to the local jurisdiction's General Plan, under Government Code Section 65860.1, jurisdictions such as the City of Manteca located in the Sacramento-San Joaquin Valley may be required to amend their zoning ordinance and other applicable ordinances to be consistent with the General Plan amendment. The zoning ordinance amendments may include updates to the local floodplain management ordinance, as applicable, in order to establish consistency with the general plan. Following the effective date of the zoning ordinance amendments to establish consistency with the General Plan update, each land use jurisdiction must adopt findings related to the Urban Level of Flood Protection (ULOP) for affected land use decisions. Accordingly, the City of Manteca adopts the findings set forth in this document in accordance with the 2007 California Flood Legislation.

II. Background Regarding Senate Bill 5

The California Legislature passed SB 5 in 2007. Effective January 1, 2008, SB 5 added or amended sections in the California Government Code, Health and Safety Code, Public Resources Code, and Water Code to outline a comprehensive approach to improving flood management at the State and local levels. SB 5 required the State to develop and adopt a comprehensive Central Valley Flood Protection Plan (CVFPP), which the Central Valley Flood Protection Board (CVFPB) approved in June 2012. SB 1278 later amended SB 5 to postpone the dates for compliance with SB 5. With the adoption of the CVFPP, cities and counties in the Central Valley were required to incorporate the CVFPP into their general plans by July 2, 2015, and into their zoning ordinances by July 2, 2016.

On December 17, 2013, the Manteca City Council adopted a General Plan Amendment for an update to the Manteca General Plan Safety Element to include text revisions and the addition of policies and implementation measures to reflect the City's commitment to comply with provisions outlined in SB5 and the CVFPP. Subsequently, as additional flood information and data became available, the City continued it's efforts in establishing compliance with the requirements of SB5 and 200-year flood protection by further refinement of the General Plan.

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[1] Note: These findings address the adequate progress findings defined in Government Code Section 65007. These findings are not intended to apply to those instances in which the local agency determines that the subject property is located in an undetermined risk area as defined under Government Code Sections 65865.5 and 65302.9(b) and has met the ULOP based on substantial evidence in the record. These findings also do not apply if the subject property is located in nonurbanized areas having the national FEMA standard of flood protection, or located in a potential flooding area of 3 feet or less from sources other than local drainage or potential flooding from local drainage that meets the national FEMA standard of flood protection.

On May 24, 2016, the Manteca Planning Commission recommended, and on June 21, 2016, the Manteca City Council adopted a General Plan Amendment for an update to the Manteca General Plan Safety Element to include goals and policies to ensure future development in Manteca complies with SB 5 and the CVFPP, and introduced an ordinance amending Chapter 17 of the Manteca Municipal Code to address the requirements of SB 5 (2007) and associated legislation related to the provision of 200-year flood protection to urban areas in Manteca. On July 5, 2016, the City Council conducted a second reading of the ordinance adopting the Manteca Zoning Code update. In accordance with Government Code Section 65302(g)(5), Manteca has adopted a floodplain management ordinance that substantially complies with the Government Code.

After the zoning ordinance amendments become effective, SB 5, as amended by SB 1278, requires Manteca to make findings related to an urban level of flood protection (200-year protection) before entering into a development agreement, issuing a discretionary approval for a new structure, or approving subdivision maps for proposed urban development projects within the ULOP 200-year deep floodplain (i.e., 3 foot or more of flooding depth). After such time, development is prohibited in areas subject to the 200-year flood (deeper than three feet) unless the City certifies that (1) 200-year flood protection is provided, or (2) "adequate progress" has been made toward providing 200-year flood protection by 2025. SB 5 defines "urban level of flood protection" as the "level of protection that is necessary to withstand flooding that has a 1-in-200 chance of occurring in any given year using criteria consistent with, or developed by, the California Department of Water Resources" (Gov't Code § 65007(l) and Water Code § 9602(i)). The Department of Water Resources (DWR) has prepared guidance for making these findings as set forth in its *Urban Level of Flood Protection* Criteria dated November 2013 (ULOP Criteria).

After the effective date of the General Plan update and zoning ordinance amendment, SB 5, as amended by SB 1278, restricts development in a 200-year floodplain, unless a city or county can make one of the following findings: that the required level of flood protection is provided by existing flood management facilities; that conditions imposed on a development project are sufficient to provide the required protection; or that adequate progress has been made on construction of a flood protection system that will provide the required level of protection. To make a finding of adequate progress, under the ULOP Criteria, after July 2, 2016 the City intends to adopt findings of adequate progress to reach the urban level of flood protection by 2025 for discretionary and ministerial permits as may be appropriate for projects located in RD 17. Accordingly, the City of Manteca adopts these findings which demonstrate that adequate progress has been made on construction of the RD 17 flood protection system to provide a 200-year level of protection by 2025.

III. Facilities of the State Plan of Flood Control

The State Plan of Flood Control is comprised of State and Federal flood management projects in the San Joaquin River watershed authorized pursuant to Article 2 (commencing with Section 12648) of Chapter 2 of Part 6 of Division 6 of the Water Code. DWR or CVFPB provided the assurances of non-federal cooperation to the United States.

Following adoption of SB 5, DWR developed the Urban Levee Design Criteria (ULDC) as required by Senate Bill 5 (Government Code § 65007(l)). The ULDC defines the urban level of flood protection as the level of protection that is necessary to withstand flooding that has a 1-in-

200 chance of occurring in any given year using DWR's criteria. The ULDC provides the engineering criteria for the urban level of flood protection used to determine the design water surface elevation along leveed and un-leveed streams. Additionally, the ULDC Criteria determine design, evaluation, and operation and maintenance of levees and floodwalls.

Manteca is protected by two different levee protection systems: RD 17 and RD 2094. These adequate progress findings apply to discretionary permits or entitlements for non-residential buildings and ministerial permits for new residential buildings issued by the City of Manteca for properties located in the Manteca portion of Reclamation District (RD) 17. Some of the RD 17 levees are identified in the State Plan of Flood Control. The 200-year adequate progress findings set forth below are based on existing flood control facilities which are currently being improved by RD 17. Approximately 84% of the length of the RD 17 levee is a project levee and included in the State Plan of Flood Control system.

IV. Requirement for SB 5 Adequate Progress Findings[2]

After the effective date of the SB 5-related zoning ordinance amendment, under Government Code Sections 65865.5, 65962, and 66474.5, Manteca is prohibited from entering into a development agreement, approving any permit, entitlement, or subdivision map unless Manteca finds one of the following:

1) Flood management facilities provide an urban level of flood protection to urbanized areas.
2) Manteca has imposed conditions on the permit or discretionary entitlement that will protect the project to an urban level of flood protection for urban or urbanizing areas.
3) RD 17 has made adequate progress on construction of a flood protection system that will result in an urban level of flood protection for urban or urbanizing areas by 2025 for property located within a flood hazard zone.

A. Adequate Progress Definition

Pursuant to Government Code Section 65007, adequate progress is defined to include the following:

1. Total project scope, schedule, and cost of the completed flood protection system have been developed to meet ULOP standard of flood protection.

2. Revenues that are sufficient to fund each year of the project schedule based on the total project scope have been identified and, in any given year, and consistent with that schedule, at least 90% of the revenues scheduled to have been received by that year have been appropriated and are currently being expended. Notwithstanding the appropriation and expenditure of 90% of the revenues for any year in which state funding is not appropriated consistent with an agreement between a state agency and a local flood

[2] The local agencies envision that these adequate progress findings may be relied upon until January 1, 2025, within certain limitations or until the findings are superseded, whichever is sooner, provided that the adequate progress requirements set forth in Government Code Section 65007(a) are met.

management agency, the CVFPB may find that the local flood management agency is making adequate progress toward the completion of the flood protection system.

3. Critical features of the flood protection system are under construction, and each critical feature is progressing as indicated by the actual expenditure of the construction budget funds.

4. The city or county has not been responsible for a significant delay in the completion of the system.

5. The local flood management agency shall provide information to DWR and CVFPB sufficient to determine substantial completion of required flood protection. Annual reports are required.

B. ULOP Criteria – Substantial Evidence Requirement

Pursuant to the ULOP Criteria published in November 2013, DWR has identified specific criteria needed in the adopted findings to determine whether the minimum requirements of SB 5 are being met to satisfy the appropriate standard of care applicable to the potential risks and consequences for the geographic area for which the findings are being adopted (see ULOP Criteria, page 2-9). To support the adequate progress findings, the ULOP Criteria include the following requirements:

> ***EVD-3**: Substantial evidence in the record to support a finding related to an urban level of flood protection based on adequate progress on the construction of a flood protection system shall include the following, at a minimum:*
>
> *A report prepared by a Professional Civil Engineer registered in California to document the data and analyses for demonstrating the property, development project, or subdivision will have an urban level of flood protection at the time when the flood protection system is completed.*
>
> *A report by an Independent Panel of Experts on the review of the report prepared by the Professional Civil Engineer.*
>
> *A response by the Professional Civil Engineer to the comments from the Independent Panel of Experts.*
>
> *The most recent annual report prepared by the local flood management agency that was submitted to the Central Valley Flood Protection Board documenting the efforts in working toward completion of the flood protection system.*
>
> *Any additional data and information that cities or counties use to make the finding.*

Under Section 3.0, Other Considerations, the ULOP Criteria describe the following recommendations related to the Engineer's Report:

> *The report prepared by a Professional Civil Engineer registered in California should provide the following information as evidence that an urban level of flood protection exists or will exist for the area under consideration:*
>
> *A list of the flood management facilities utilized in providing an urban level of flood protection, including, but not limited to, SPFC facilities.*
>
> *The location of the flood management facilities utilized in providing an urban level of flood protection.*
>
> *The entities that operate and maintain the flood management facilities utilized in providing an urban level of flood protection.*
>
> *A list of, and consideration of, reports, evaluations, inspections, and performance history of the flood management facilities utilized in providing an urban level of flood protection since the previous finding, if any, was made.*
>
> *The response to the Independent Panel of Experts.*

V. Adequate Progress Findings

The City of Manteca adopts the following adequate progress findings for affected land use decisions for projects in RD 17 in accordance with the requirements of SB 5 and the DWR Guidance contained in the ULOP Criteria. These findings are intended to accompany and support the City's approval of individual project affected land use decisions.

A. Record of Proceedings

Manteca relies on the Adequate Progress Report accepted by the local flood management agency. Lathrop, Manteca and RD 17 currently are serving as the local flood management agency for purposes of engaging necessary consultants and coordinating efforts to prepare the information, analysis and documentation required by the Central Valley Flood Protection Act of 2007 (the "Local Flood Management Agency" or "LFMA") in order to support the land use agencies' respective findings of adequate progress for discretionary and ministerial approvals for development projects in RD 17 in accordance with the Central Valley Flood Protection Act of 2007. The Local Flood Management Agency completed the necessary documentation required by the ULOP Criteria. On June 6, 2016, as an acting Local Flood Management Agency, Manteca accepted the documents for the ULDC analysis and for Adequate Progress toward providing a 200-year ULOP in RD 17.

In accordance with DWR's ULOP Criteria, these Adequate Progress Findings are based upon the following documents on file with the City of Manteca Planning Department and incorporated herein by reference, including but not limited to:

1) The Engineer's Report for the Urban Levee Design Criteria Evaluation of the RD 17 Levee prepared by a team of Professional Engineers led by Peterson Brustad (PBI) in coordination with their subconsultants, Kjeldsen, Sinnock and Neudeck Inc. (KSN) and ENGEO dated March 22, 2016 ("PBI Engineer's Report"). The PBI Engineer's Report is composed of 11 volumes of binders covering the subjects that are required for an ULDC evaluation. The PBI Engineer's Report is dated March 22, 2016 compiled under a Cover Memorandum entitled "Urban Levee Design Criteria (ULDC) Evaluation of the RD17 Levee." The ULDC Evaluation of the RD 17 Levee constitutes the report prepared by a Professional Civil Engineer registered in California to document the data and analyses for demonstrating the property, development project, or subdivision will have an urban level of flood protection at the time when the flood protection system is completed.

2) The Cities of Lathrop and Manteca and RD 17 (as the local flood management agency) will adopt the report entitled: Area: Adequate Progress Report for Urban Level of Protection, Final Report dated June 14, 2016 prepared by Larsen Wurzel Associates (the "Adequate Progress Report"). The first annual report will be provided to the CVFPB following adoption by all three agencies comprising the LFMA.

3) A report by an Independent Panel of Experts (IPE) on the review of the report prepared by the Professional Civil Engineer. An independent panel of experts consisting of Robert Pyke, Edwin Hultgren, and Thomas Plummer was engaged to review the Engineer's Report. Their report dated May 24, 2016, titled: "Independent Review of Urban Levee Design Criteria Evaluation, March 2016" fulfills this requirement.

4) A response by the Professional Civil Engineer to the comments from the Independent Panel of Experts. PBI, author of the documents reviewed in the IPE Report, responded on June 3, 2016. In that response, Dave Peterson confirmed that none of the IPE comments would substantially change the project outlined in the Engineer's Report. Most of the IPE comments were addressed in the Engineer's Response, and the remainder will be addressed during design development.

5) The most recent annual report prepared by the local flood management agency that was submitted to the Central Valley Flood Protection Board documenting the efforts in working toward completion of the flood protection system. As indicated in the Adequate Progress Report, the report will serve as the first Annual Report, and will be updated annually starting in July 2017.

These reports, in combination with additional materials prepared by the acting LFMA, are intended to support the evidentiary requirements of Adequate Progress Findings. In addition to the specific reports identified above, Manteca relies on the following additional data and information included in the record of proceedings to support its Adequate Progress Findings: all staff reports, City files and records and other documents prepared for and/or submitted to the

City Council and the City relating to the RD 17 Levee Project; the evidence facts, findings and other determinations set forth in these findings; the City of Manteca's General Plan and the Manteca Municipal Code; all applications, designs, plans, studies, data and correspondence submitted by RD 17 and the LFMA in connection with the RD 17 Levee Project; all documentary and oral evidence received at public meetings or submitted to the City during any comment periods relating to the RD 17 Levee Project, all other matters of common knowledge to the City Council including, but not limited to, City, state and federal laws, policies, rules, regulations, reports, records, and projections related to development within RD 17.

The Adequate Progress Report addresses how the flood protection system that will provide an urban level of flood protection will be funded and financed. The Adequate Progress Report describes the proposed funding mechanisms, the approach and schedule for their implementation and the projected revenues that the land use agencies and RD 17 have identified to support implementation of the flood protection system protecting RD 17.

The Adequate Progress Report is referenced by the City of Manteca in making its findings related to approval of development projects that rely on these Adequate Progress Findings. The Adequate Progress Report will be updated and supplemented with additional information to support future annual Adequate Progress Reports that are required to be presented to the Central Valley Flood Protection Board.

B. Applicable Geographic Area

Manteca adopts these Adequate Progress Findings for land use decisions within the urban and urbanizing RD 17 Basin identified as the applicable geographic area in accordance with Government Code Sections 65865.5, 65962, and 66474.5. The applicable geographic area covers a total of 16,107.38 acres as described in the Adequate Progress Report. The applicable geographic area is the RD 17 Basin bounded by leveed waterways: the San Joaquin River on the west, French Camp Slough on the north, and the non-Project Walthall Slough dryland levee on the south.

The RD 17 levees were initially constructed or reconstructed by the District in about 1863. The Lower San Joaquin River Levee Project is a unit, and was authorized by the Flood Control Act of 22 December 1944, Public Law 534, 78th Congress, 2nd Session, Section 10. The RD 17 levee system is comprised of about 16.2 miles of project levees, including the RD 17 levees along the left bank of French Camp Slough, the levees along the right bank of the San Joaquin River, and the levees along the right bank of Walthall Slough. The RD 17 levee includes about 2.8 miles of dryland levees mostly located at the southern end of RD 17. The dryland levees are not included in the State Plan of Flood Control, and are not project levees.

RD 17 includes urban portions of Stockton, Lathrop, and Manteca, urbanizing areas between these cities, critical County hospital and jail facilities, and other critical infrastructure. The existing population in the Basin is estimated to be 46,500 residents. The RD 17 levee system currently protects approximately 10,698 dwelling units, and 182 non-residential (commercial/ industrial and public) properties with a total floor area of 11,858,000 square feet.

In RD 17, the early agricultural, residential, commercial and industrial development was followed by increased urban growth of the Stockton, Lathrop and Manteca communities into unincorporated areas of San Joaquin County. Due to the urbanization which has transpired over many decades, large populations already exist within the RD 17 Basin. FEMA accreditation of the RD 17 levees in 1990 was particularly significant in contributing to such increased urbanization. While the City limits of Stockton and Manteca include agricultural areas that are outside the flood plain, the City of Manteca is entirely within the flood plain. Today, RD 17 includes over 6,345 acres of highly developed agricultural lands that produce a variety of tree, row and field crops, and the basin also includes urban areas within San Joaquin County, the cities of Stockton, Lathrop, and Manteca, and the urbanizing areas between these cities.

Status of Levee Protection System

On September 2, 2011, FEMA confirmed the accreditation of all of the RD17 levees, and mapped the area protected by the RD 17 levees as moderate hazard (shaded X). In 2014, Peterson Brustad, Inc. (PBI) modeled the San Joaquin River system for the cities of Lathrop and Manteca as part of their joint effort to bring the RD 17 levees up to ULDC standards as further summarized in the PBI Engineer's Report.

The existing RD 17 levees currently do not meet the updated DWR ULDC standards adopted in May 2012, and the existing levees are not currently certified to provide 200-year protection. Accordingly, RD 17's plan for flood protection through the year 2025 consists of two components: (1) RD 17 Levee Seepage Repair Project (LSRP) and (2) RD 17 Levee Improvements to achieve ULDC 200-year requirements (the "Fix-In-Place" Project or "Project"). The "Fix-in-Place" Project will provide 200-year flood protection for RD 17 and the approximately 46,500 residents, two major highways, two major railroads, and public facilities as addressed in the PBI Engineer's Report.

C. Affected Land Use Decisions

Manteca adopts these Adequate Progress Findings for the following land use decisions for projects located within RD 17:

- entering into a development agreement for all types of property development;
- approving a discretionary permit or entitlement that results in construction of a new building (or increase in occupancy of an existing building);
- approving a ministerial permit for projects that would result in construction of a new residence;
- approving a tentative map for all subdivisions; and
- approving a parcel map for which a tentative map is not required.

D. Adequate Progress Findings

For the reasons discussed below, Manteca finds that the LFMA has adopted a plan to achieve ULOP 200-year flood protection for the applicable geographic area by 2025.

1. **Total project scope, schedule, and cost of the completed flood protection system have been developed to meet the ULOP standard of flood protection.**

The following summarizes the total project scope, schedule and cost to complete the proposed 200-year flood protection system improvements by 2025.

Total Project Scope

Since 2008, RD 17 consistently worked to implement its plan for flood protection, and specifically, the levee seepage repairs. RD 17 and the local land use agencies have developed a plan that addresses the completion of the next phase of flood protection involving the provision of 200-year flood control for RD 17 by 2025. The RD 17 Levee Project consists of two components: (1) RD 17 Levee Seepage Repair Project (LSRP) and (2) RD 17 Levee Improvements to achieve ULDC 200-year requirements (Fix-In-Place Project). Collectively, the LSRP and the Fix-In-Place Project are referred to as the RD 17 Levee Project and are designed to:

- complete the levee seepage repair improvements,
- increase level of flood protection to 200-year ULDC standards,
- decrease risks to life safety,
- decrease economic damages,
- improve operations and maintenance (O&M),
- improve institutional support, and
- reduce State liability for flood damage.

The RD 17 levees are currently accredited to 100-year FEMA standards per 44 C.F.R. 65.10 and are in the midst of a 3-phase LSRP, intended to improve seepage performance. The extents of the LSRP project are addressed in the PBI Engineers Report. Improvement plans for all 3 phases of the LSRP are included in Volume 11 of the ULDC PBI Engineer's Report.

Schedule

As documented in the PBI Engineer's Report and page 6 of the Adequate Progress Report, all ULDC analyses in the Engineer's Report assume that Phases 1 through 3 of the LSRP will be complete by 2019. The ULDC improvements identified in the Engineer's Report will be implemented as Phase 4 of the RD 17 Levee Project. The total program for achieving a ULOP by 2025 includes the four phases of the RD 17 Levee Project identified in the PBI ULDC Evaluation of the RD 17 Levee System Cover Memo dated March 22, 2016, page 2, as further described in the PBI Engineer's Report.

Following the development of the proposed Fix-In-Place Project design, the LFMA will obtain approval by the State of California for the RD17 levee system to meet the 200-year ULDC, and then will construct the levee improvements to provide flood protection equal to the urban level of flood protection by 2025.

Page 7 of the Adequate Progress Report sets forth the schedule of milestones regarding the Local Flood Management Agency's current plan to implement the RD 17 levee improvements by 2025.

Total Program Costs for 200-year Flood Protection System

The total costs for the LSRP and Fix-In-Place (ULDC) Project (Phase 4) are summarized in Table 1 in the Adequate Progress Report. The total estimated design, permitting, and construction Project costs in 2016 dollars is $199.1 million (see page 7 of the Adequate Progress Report, including the Appendices).

> 2. **Revenues that are sufficient to fund each year of project schedule based on the total project scope have been identified and, in any given year, and consistent with that schedule, at least 90% of the revenues scheduled to have been received by that year have been appropriated and are currently being expended. Notwithstanding the appropriation and expenditure of 90% of the revenues for any year in which state funding is not appropriated consistent with an agreement between a state agency and a local flood management agency, the CVFPB may find that the local flood management agency is making adequate progress in working toward the completion of the flood protection system.**

For purposes of this definition, adequate progress means that revenues are sufficient to fund each year of project schedule have been identified and, in any given year, and consistent with that schedule, at least 90% of the revenues scheduled to have been received by that year have been appropriated and are currently being expended. Notwithstanding this first sentence, for any year in which state funding is not appropriated consistent with an agreement between a state agency and a local flood management agency, the CVFPB may find that the local flood management agency is making adequate progress in working toward the completion of the flood protection system.

RD 17 and the local agencies are using a combination of private and public sources to fund the cost of the entire RD 17 Levee Project including the RD 17 LSRP and the Fix-In-Place Project. As documented in the Adequate Progress Report, the LFMA has concluded that revenues have been identified to support the implementation of the RD 17 Levee Project to achieve the urban level of flood protection by 2025.

As set forth in the Adequate Progress Report, RD 17 has been advancing the LSRP since 2008 with the levy of the Reclamation District No. 17 (Mossdale Tract) Assessment (RD 17 Assessment) and funding from DWR's Early Implementation Projects (EIP) Program. In order to fund the Fix-In-Place portion of the RD 17 Levee Project, the LFMA evaluated and proposes to utilize the following funding sources for the design, permitting and construction of the ULOP improvements.

The near term potential funding sources include:

- Net revenues from RD 17's existing Special Benefit Assessment,
    - Some net revenues (after debt service, RD 17 O&M expenses and pay-as you- go funding for the final construction of the LSRP) will be available to fund the Fix-in- Place project.
- A new regional RD 17 200-Year Development Impact Fee
    - A new Development Impact Fee would be paid by property owners developing property within the Basin. It is expected that some of the property already entitled and planned for development within the basin that will benefit from the Urban Level of Protection may advance fund some of the Project's development impact fee obligation with the expectation that the advance funding will be creditable toward the project's ultimate fee obligation.
- A new Special Benefit Assessment or Special Taxing District
    - A new special benefit overlay assessment or parcel taxing district that levies assessments or taxes on the properties (parcels) directly receiving flood damage reduction benefit from the construction and long term operations and maintenance of the Fix-In-Place project.
- A new Enhanced Infrastructure Financing District (EIFD)
    - A new EIFD that may capture a portion of the growth in general property taxes and dedicate the revenue toward the construction of the Fix-In-Place project. This revenue, in conjunction with the new Special Benefit Assessment or Special Taxing District revenues could be pledged to the repayment of Bonds the proceeds of which could fund construction of the Fix-In-Place project.

LSRP Financial Plan

As noted above and in the Adequate Progress Report, the LSRP was funded from a combination of State funding through the EIP Program and local funding from RD 17 which was generated by a special benefit assessment approved in July 2008. The KSN Engineer's Report supporting the special benefit assessment describes the funding approach for the implementation of the LSRP. This document is available from the City of Manteca Public Works Department upon request and incorporated by reference.

Fix-In-Place Financial Plan

The Finance Plan for the Fix-In-Place portion of the Project is based on the projected amount of planned development within RD 17 including geographic areas within Lathrop, Manteca,

Stockton and San Joaquin County. The cost of the RD 17 levee improvements set forth in the Adequate Progress Report will be funded from a combination of funding sources identified above and further discussed in the Adequate Progress Report.

Potential Grant Funding

The local sponsors have identified local funding for each year of the Fix-In-Place Project construction to demonstrate that RD 17 and the LFMA is making adequate progress toward the completion of the RD 17 flood protection system. Although these adequate progress findings are based on a local agency/developer-sponsored Fix-In-Place Project (no grant funding), the local agencies are concurrently exploring opportunities to secure state grant funds under the State Urban Flood Risk Reduction (UFRR) program for design phase services. On May 15, 2015, DWR conditionally approved a $5 million grant for study and preliminary design of flood risk reduction in RD 17 under the UFRR program. DWR further clarified in a November 20, 2015 letter additional scope requirements for the study phase of the UFRR Grant-funded work. In order for the Fix-In-Place Project to be eligible for additional grant funding, DWR has indicated that the local agencies will need to demonstrate how the RD 17 Levee Project addresses the following:

- further reduction of development in the deep floodplain,
- preservation of agricultural land, and
- incorporation of multi-resource beneficial facilities into the flood protection design.

In furtherance of these efforts, the local agencies intend to form a joint powers authority (JPA) to pursue the potential:

- adoption of fee programs and/or exactions paid and advanced from property owners in areas of entitled and planned development within the basin that will benefit from the Fix-In-Place Project;
- establishment of a new Special Benefit Assessment or Special Taxing District to levy assessments or taxes on properties receiving flood damage reduction benefit; and
- overlay of a new Enhanced Infrastructure Financing District.

The JPA would also be created in order to implement and administer the programs identified in the Adequate Progress Report for both the locally funded approach as well as pursue potential grant funding opportunities. In addition, the local land use agencies are undertaking the following initiatives in order to position the area for grant funding opportunities.

The land use agencies are limiting development in the deep part of the floodplain. To accomplish the grant-funding option, the Fix-In-Place Project balances vested rights protections with the vision of the Delta Plan and other regional and Statewide efforts which may influence future land planning efforts in RD 17. Adopted by the Delta Stewardship Council on May 16, 2013, the Delta Plan prohibits development of agriculturally zoned property within the Delta Secondary Zone outside the city limits of Stockton, Manteca and Lathrop unless the area is both within a City Sphere of Influence and is zoned for development. As shown on Exhibit A, this

restriction may protect up to another 3,400 acres within RD 17 from future unentitled development, much of which is also within the deep floodplain located in RD 17 (*see* Exhibit B). As a further commitment toward this goal to limit development in the deepest part of the floodplain and meet the intent of Executive Orders 11988, the local land use agencies are undertaking the following initiatives:

- At *Lathrop's* request, and on May 12, 2016, the San Joaquin LAFCo agreed to reduce Lathrops's Sphere of Influence by 2,022 acres, between the San Joaquin River and Interstate 5, to the limit of the Central Lathrop Specific Plan area. This has eliminated any potential future urban development in this area, and preserves the existing agricultural land use designation of these parcels in accordance with the County General Plan and the Delta Plan.
- *Stockton* has initiated a two-year long process to update its General Plan that will entail exploring a reduced General Plan service boundary, while holding the Sphere of Influence boundary in its current location and conducting thoughtful planning of urban land use designations that recognize the need for open space and agricultural land preservation, particularly in areas protected by the Delta Plan.
- *San Joaquin County* intends to update its General Plan and Zoning Code in compliance with SB 5 to require a higher level of flood protection for new development.
- *Manteca* is also implementing a General Plan update that promotes additional flood protection including an alignment determination of the dry-land levee extension. The City intends to consider alternatives such as rezoning and/or reduction in the City's boundary for developable lands that would not otherwise benefit from 200-year flood protection.

The land use agencies are committed to exploring opportunities to target additional preservation in the deepest part of the floodplain. In addition to the land use policy actions underway, the local agencies are furthering their efforts to achieve the objectives of the Delta Plan policy "ER R2" for the Lower San Joaquin River floodplain which focuses on integrating habitat restoration with flood management actions, *when feasible*. To achieve the Delta Plan's policy, however, the local land use agencies must balance vested rights protections with the State's interest in addressing flood risk and habitat restoration opportunities. In furtherance of their commitment to meeting the Delta Plan and the State's policy objective for wise use of the floodplain, the local agencies intend to seek funding sources to fund the acquisition of permanent open space and conservation easements from willing sellers so that habitat restoration and floodplain management can be accomplished in a feasible and effective manner.

Land Use Agencies are Targeting Funds to Achieve Multiple Resource Benefits. San Joaquin County and its cities have adopted the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP) to provide a strategy for balancing the need to conserve open space with the conversion of open space to non-open space uses while protecting the region's agricultural economy and providing for the long-term management of plant, fish and wildlife species. Development projects in RD 17 contribute fees to the SJMSCP for the preservation of habitat and open space. These easements protect lands from development throughout San Joaquin County, and thus, provide opportunities for both habitat restoration and floodplain

management in perpetuity. The SJMSCP has launched an aggressive effort to develop a system of preserves along Paradise Cut, Old River, and Middle River in the deep floodplains adjacent to the City of Manteca as shown on the SJMSCP Preserve/Negotiated Lands Map dated August 2015 on file at the Manteca Planning Department. Since August, the SJMSCP successfully incorporated all of the "negotiated lands" into its preserve system.

In Manteca, the Central Manteca Specific Plan provides approximately $10 million in revenue toward habitat preservation, of which $2.6 million has already been paid and was instrumental in the acquisition of the preserves. Every acre of greenfield development in Manteca triggers a habitat protection fee.

The Land Use Agencies are Exploring Ways to Target Funds to Protect Farmland Within RD 17. San Joaquin County and the cities of Stockton, Lathrop and Manteca adopted Agricultural Mitigation Fee Programs that are directed toward acquiring permanent conservation or agricultural easements. For example:

- *San Joaquin County* requires 1:1 mitigation for agricultural land converted to a non-agricultural use. In lieu of acquiring land, the project proponents may pay a fee (currently $8,675 per acre).
- *Lathrop* is a partner with the Central Valley Farmland Trust under its Agricultural Mitigation Fee program. Lathrop has committed to reach out to the Farmland Trust to explore ways to encourage the use of over $4 million in revenue to acquire easements on prime farmland property in the deep flood plain north of Lathrop's Sphere of Influence.
- *Stockton* also collects and Agricultural Mitigation Fee to mitigate the loss of agricultural land in the City of Stockton which provides for the acquisition of agricultural conservation easements at a 1:1 ratio. Like Lathrop, Stockton partners with the Central Valley Farmland Trust to negotiate and acquire conservation easements throughout San Joaquin County, including land areas within RD 17.
- *Manteca* is also a partner with the Central Valley Farmland Trust under its Agricultural Mitigation Fee program. Manteca collects an Agricultural Mitigation Fee of $2,642 per acre adjusted annually. The City has collected approximately $2.2 million in fees devoted to the preservation of agricultural land.

State funding with the local match totals $10 million for the Fix-In-Place Project design effort. This funding is available for the Fix-In-Place Project planning effort. If grant funding is secured, the program elements addressing multi-resources benefits, agricultural land preservation and the wise use of the deep parts of the floodplain will be incorporated into the Fix-in-Place portion of the RD 17 Levee Project. In the meantime, the City of Manteca and local communities in RD 17 are implementing the Fix-In-Place Financial Plan and the local funding efforts for the RD 17 Levee Project.

Funding for Emergency Response Planning

RD 17, the land use agencies, and two other reclamation districts (RD 2107 and 2062) currently collaborate in the implementation of ongoing efforts to improve their flood response capability in

the event flooding pushes the levee system to its breaking point in the Lower San Joaquin River Basin. The local agencies have received grant funding to upgrade their flood response capability and to specifically coordinate flood response with the local land use agencies within their borders. The San Joaquin County Office of Emergency Services (OES) coordinates emergency response planning and activities among the local parties. OES is considered one of the strongest programs in the state and was recently awarded a $1.6 million grant to improve its interagency flood response planning and to increase the availability of flood fighting supplies to local levee maintaining agencies. San Joaquin County currently implements a flood alert system which provides real-time monitoring of water levels in many of the major streams and rivers that pose a flood threat to the Stockton metropolitan area. This system will continue to be used as part of the decision-making process to deploy flood prevention and flood fighting efforts before and during major storm events.

3. **Critical features of the flood protection system are under construction, and each critical feature is progressing as indicated by the actual expenditure of the construction budget funds.**

RD 17 is in the process of completing Phase 3 of the LSRP to improve the seepage repair on the RD 17 levees to meet USACE current seepage standards. The Engineer's Report describes the remaining critical features that must be completed in Phase 3 of the RD 17 Levee Project.

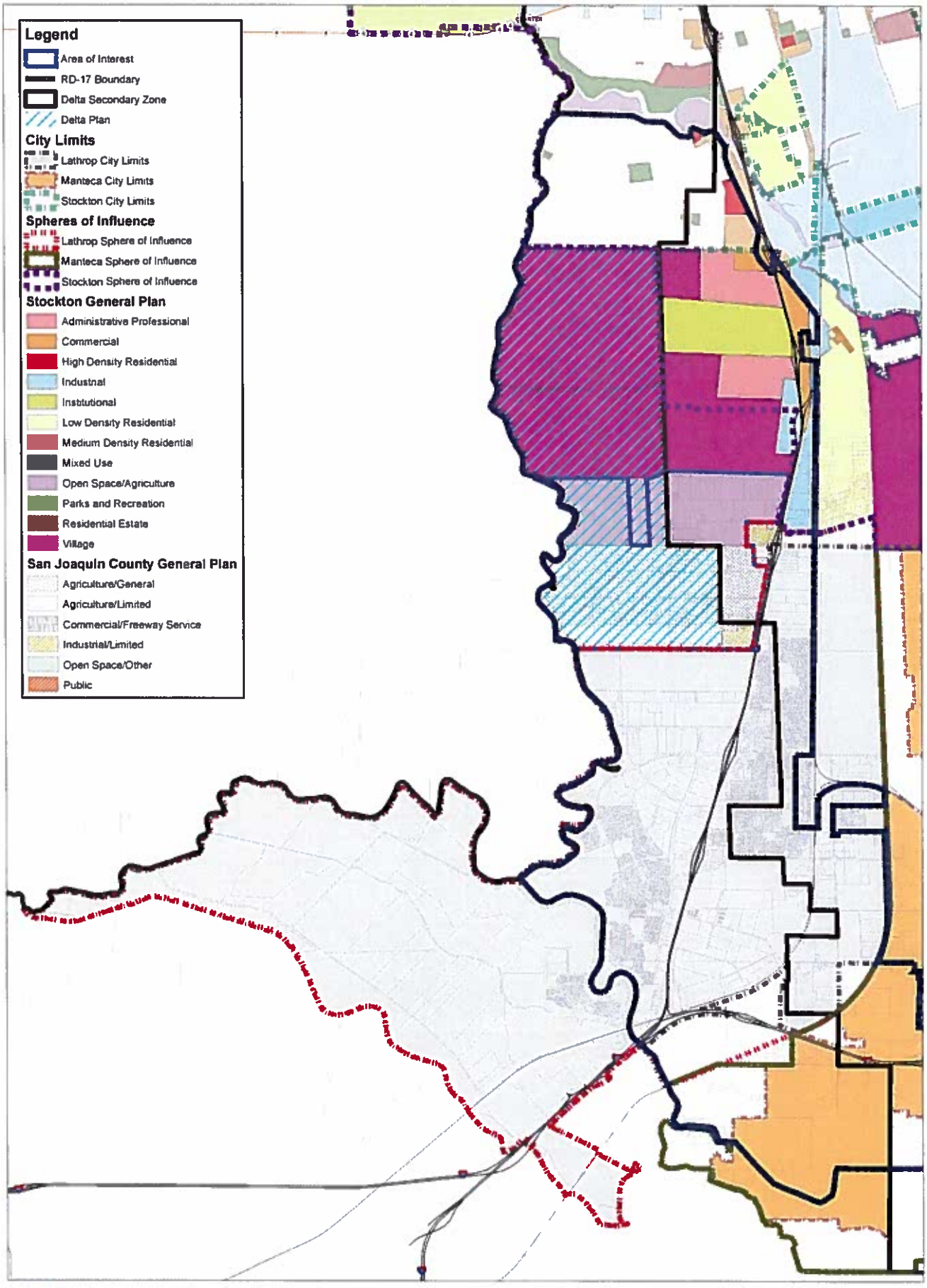
4. **Manteca has not been responsible for a significant delay in the completion of the system.**

Manteca adopted its zoning ordinance update on June 21, 2016. Manteca has conditioned new development on the advance payment of funds to support construction of the Fix-In-Place Project. RD 17 has continued to implement the LSRP in reliance upon funds generated from the RD 17 benefit assessment district.

RD 17 and Manteca, acting as the LFMA, will provide information to DWR and the CVFPB following adoption by all three agencies comprising the LFMA. The information submitted to DWR and the CVFPB is based on the substantial evidence supporting these findings and is sufficient to determine substantial completion of the required flood protection to achieve 200-year flood protection by 2025.

Conclusion

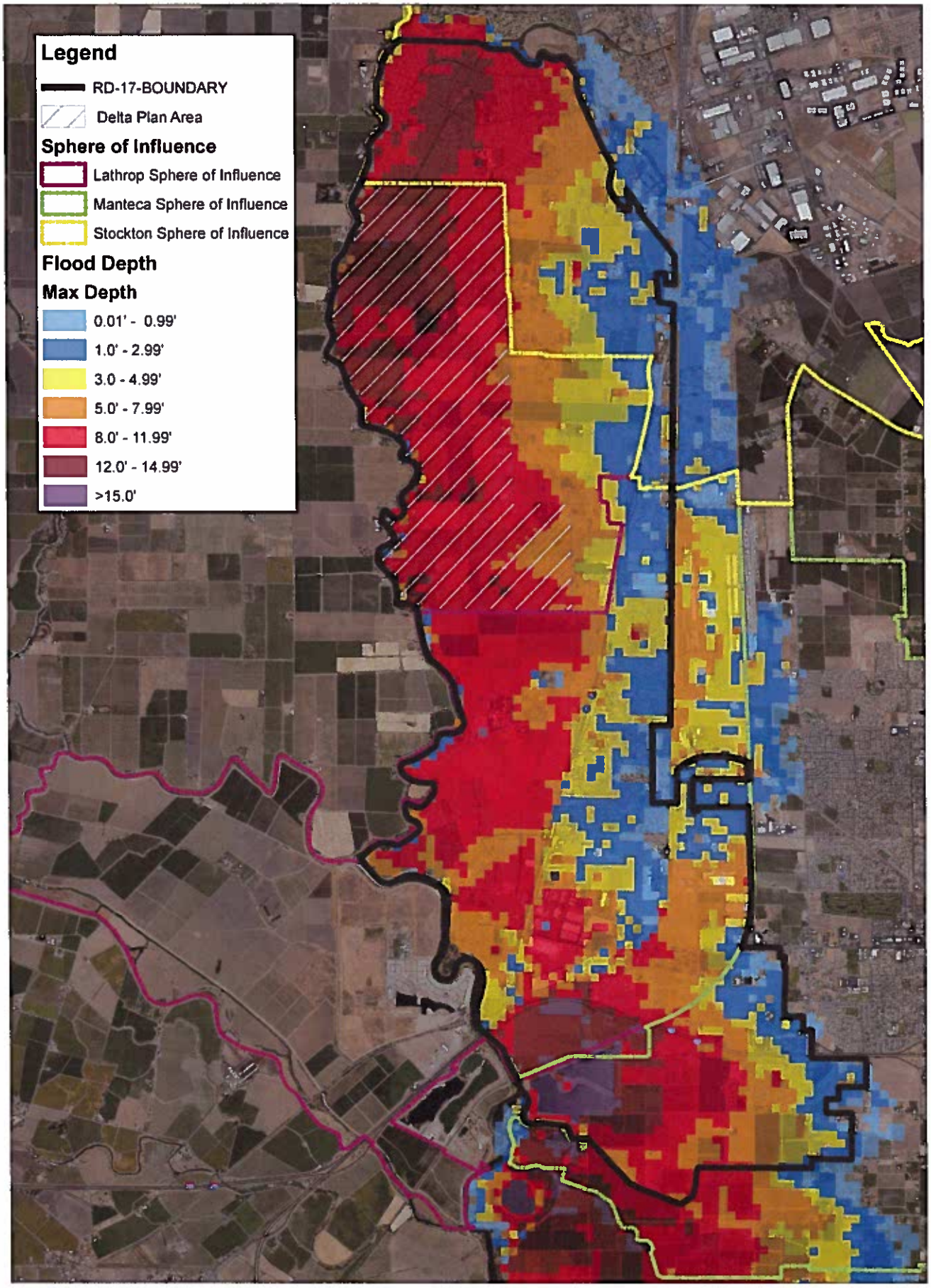
Based on the information presented above, Manteca finds that the Local Flood Management Agency is making adequate progress in the provision of 200-year flood protection by 2025 for RD 17. Based on the referenced extensive analysis and assumptions as further discussed in the attached reports and documents comprising the record of proceedings, affected land use decisions for development in RD 17 will have 200-year flood protection by 2025.



Land Use Located Outside of the Delta Plan

City of Lathrop

EXHIBIT A



200-Year Flood Depths within RD17

City of Lathrop

EXHIBIT B

State of California—Transportation Agency EDMUND G. BROWN Jr., Governor

DEPARTMENT OF CALIFORNIA HIGHWAY PATROL
Stockton Area
2720 Wilcox Road
Stockton, Ca 95215
(209) 938-4800
(800) 735-2929 (TT/TDD)
(800) 735-2922 (Voice)

September 15, 2016

File No.: 265.11871.15370

RECEIVED
Sept OCT 20 2016
COMMUNITY DEVELOPMENT
DEPARTMENT

Ms. Rochelle Henson
City of Manteca
1001 W. Center Street
Manteca, Ca 95337

Dear Ms. Durrer:

The Stockton Area Office of the California Highway Patrol recently received a "Notice of Preparation" environmental document for the proposed Oakwood Landing – Cerri & Denali Subdivisions, State Clearing House (SCH) #2016082046. After our review, we have concerns with the potential impact this project could have on traffic congestion and service delivery.

Our concerns relate to the proposed construction of up to 290 high density residential units, 975 low density residential units, 237,838 square feet of commercial uses, comprising a total of 258.29 acres of land. The project is located in close proximity to State Route 120 (Manteca Bypass) which serves as an artery for the City of Manteca and the greater region for vehicles traveling to the Bay Area. State Route 120 is located between Interstate 5 and State Route 99 and is already heavily impacted by vehicular traffic. This location consists of two lanes of travel in both the eastbound and westbound direction. The Airport Way on/off ramps are currently of a single lane configuration that do not accommodate high volumes of traffic. Additionally, this a common on/off ramp configuration for the adjoining State Route 120 access points as well. The local roads in the immediate vicinity of this project are single lanes in all directions, which have insufficient infrastructure to safely accommodate the expected increase in vehicular traffic. Additionally, State Route 120 already experiences a significant amount of collisions due, in large part, to congested traffic; Airport Way in particular. The Stockton Area would strongly recommend this project incorporate substantial infrastructure upgrades for both the local surface streets and, in particular, increasing the vehicular volume capacity of SR-120. Without substantial infrastructure upgrades this project could have a negative impact on our operations due to; the increased traffic congestion, which could lead to a potential increase in traffic collisions; increased response times; delays in emergency services; and the negative impact to the safe movement of people, services, and commerce within our jurisdiction.

Should you have any questions or need additional information, please feel free to contact Lieutenant K. Knopf, of this command, directly at (209) 938-4800

Sincerely,

B. KOENIG, Captain
Commander
Stockton Area

September 12, 2016

City of Manteca Planning Division
Rochelle Henson, Senior Planner
1001 W. Center Street
Manteca, CA 95337

RE: Environmental Impact of Oakwood Landing – Cerri & Denali Subdivisions and recommended conditions of approval

Dear Ms. Henson,

Thank you for this opportunity to comment on the Oakwood Landing Cerri & Denali Subdivisions ("Proposed Development"). We look forward to working with the City of Manteca (the "City") and the applicant to ensure that impacts of the Proposed Development are accurately identified and addressed.

As you are aware, the Manteca Unified School District (the "School District") is responsible for providing K-12 public school services to children living within its boundaries. The School District's boundaries encompass approximately 113 square miles including portions of the City of Stockton, City of Lathrop, City of Manteca and the community of French Camp.

Given the large geographical size of the School District, the mitigation of school facilities impacts is not as simple as identifying how potential students would be housed on a "District-wide" basis. In order to lessen the impact of the Proposed Development on the infrastructure of the City and develop and maintain the community feel of the portion of the City south of Highway 120 (the "Impact Area") the School District's preferred plan is to house students residing within the Impact Area by constructing two (2) Elementary Schools (Grades K-8) and one (1) High School (Grades 9-12). The School District has purchased sites for these planned facilities; however, this plan is subject to the sufficiency of funding. Below is an outline of the identified impact of future units planned to be built in the Impact Area, including the Proposed Development.

Existing Capacity

The School District currently operates three (3) Elementary Schools (Grades K-8) within the Impact Area with a combined permanent capacity of 2,560. In School Year 2015/2016 the enrollment at these schools totaled 2,012 students resulting in excess capacity sufficient to house 548 future students. The School District does not operate a High School (Grades 9-12) within the Impact Area. Excess capacity will be utilized to mitigate a portion of the impact of new residential development within the Impact Area.

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2271 West Louise Avenue, Manteca CA 95337

Phone (209) 858-0728
Fax (209) 858-7533
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Nile Garden Elementary School 5600 East Nile Avenue Manteca, CA 95337	Veritas Elementary School 1600 Pagola Avenue Manteca, CA 95337	Woodward Elementary School 565 Tannehill Street Manteca, CA 95337

Student Generation

When evaluating the impact of future residential development within the Impact Area the School District has utilized historical student generation rates. The table below summarizes this analysis:

Item	Elementary School (Grades K-8)	High School (Grades 9-12)	Total
Planned Residential Units Within Impact Area			5,351
Student Generation Rate	0.4805	0.2299	0.7104
Projected Students	**2,571**	**1,230**	**3,801**

Net Student Impact

After accounting for the excess capacity identified, the School District expects to need to provide additional school facilities to house approximately 3,253 students. The table below summarizes this analysis:

Item	Elementary School (Grades K-8)	High School (Grades 9-12)	Total
Projected Students	2,571	1,230	3,801
Excess Capacity	548	0	548
Net Student Impact	**2,023**	**1,230**	**3,253**

Fiscal Impact

Based on past experience and current cost estimates, the School District has estimated the costs associate with housing students within the Impact Area and applied it to the units planned within the Proposed Development. The table below summarizes this analysis.

Item	Elementary School (Grades K-8)	High School (Grades 9-12)	Total
Planned Residential Units within Proposed Development			1,265
Facilties Cost Impact Per Unit	$13,755	$16,682	$30,437
Fiscal Impact Per Unit	**$17,400,171**	**$21,102,109**	**$38,502,280**

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Based on an analysis of the School District's current developer impacts fees, justified pursuant to Education Code Section 17620 and Government Code Section 65995 ("School Fees") and the current State of California New Construction Grant program terms and amounts, the School District expects to experience a significant shortfall in the funds needed to mitigation the impacts of the Proposed Development. The table below summarizes this analysis.

Item	Elementary School (Grades K-8)	High School (Grades 9-12)	Total
Fiscal Impact Per Unit	$13,755	$16,682	30,437
Estimated State Funding Per Unit	$7,066	$4,135	11,201
Estimated School Fees Per Unit			$9,744
Net Fiscal Impact per Unit			**$9,492**
Planned Residential Units within Proposed Development			1,265
Total Net Fiscal Impact			**$12,007,380**

The School District would like to work with the City and the applicant to establish terms for the full mitigation of the identified school facilities impacts. To the extent that terms cannot be agreed upon the School District's alternative plan is to house all future students generated by the Development in school facilities located North of Highway 120 subject to the availably of capacity on a grade level by grade level and year by year basis ("Alternative Housing Plan"). The Alternative Housing Plan may result in significant disruption for future homeowners and increase traffic and other environmental impacts.

At this time the School District requests that a complete analysis of the impact of the Proposed Development on public school facilities be included in the Environment Impact Report. We also ask that when evaluating the environmental impacts of the Proposed Development the applicant consider the Alternative Housing Plan and its effects on other areas of the impact analysis including Transportation and Circulation, Noise, and Air Quality.

Thank you again for the opportunity to provide input. We would be happy to meet with the City and/or the applicant to provide additional information and to discuss options to mitigate the impact the Proposed Development will have on public school facilities. You may reach me at (209) 858-0731 or jbreitenbucher@musd.net.

Best Regards,

J Breitenbucher

Jacqui Breitenbucher
Senior Director of Business Services/Chief Business Officer
Manteca Unified School District

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NATIVE AMERICAN HERITAGE COMMISSION
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Edmund G. Brown Jr., Governor

RECEIVED
SEP 14 2016
COMMUNITY DEVELOPMENT
DEPARTMENT

September 12, 2016

Rochelle Henson
City of Manteca
1001 W. Center Street
Manteca, CA 95337

RE: SCH#2016082046, Oakwood Landing- Cerri & Denali Subdivisions, San Joaquin County

Dear Ms. Henson:

The Native American Heritage Commission has received the Notice of Preparation (NOP) for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code § 21000 et seq.), specifically Public Resources Code section 21084.1, states that a project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, § 15064.5 (b) (CEQA Guidelines Section 15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an environmental impact report (EIR) shall be prepared. (Pub. Resources Code § 21080 (d); Cal. Code Regs., tit. 14, § 15064 subd.(a)(1) (CEQA Guidelines § 15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources with the area of project effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code § 21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code § 21084.3 (a)). **AB 52 applies to any project for which a notice of preparation or a notice of negative declaration or mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements**. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. § 800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments. **Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws**.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public

agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:

a. A brief description of the project.
b. The lead agency contact information.
c. Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code § 21080.3.1 (d)).
d. A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code § 21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code § 21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or environmental impact report. (Pub. Resources Code § 21080.3.1(b)).
   a. For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code § 65352.4 (SB 18). (Pub. Resources Code § 21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:
   a. Alternatives to the project.
   b. Recommended mitigation measures.
   c. Significant effects. (Pub. Resources Code § 21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:
   a. Type of environmental review necessary.
   b. Significance of the tribal cultural resources.
   c. Significance of the project's impacts on tribal cultural resources.
   d. If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code § 21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code sections 6254 (r) and 6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code § 21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:
   a. Whether the proposed project has a significant impact on an identified tribal cultural resource.
   b. Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code section 21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code § 21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:
   a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or
   b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code § 21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code section 21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code section 21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code § 21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code section 21084.3 (b). (Pub. Resources Code § 21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:
    a. Avoidance and preservation of the resources in place, including, but not limited to:
        i. Planning and construction to avoid the resources and protect the cultural and natural context.
        ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
    b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
        i. Protecting the cultural character and integrity of the resource.
        ii. Protecting the traditional use of the resource.
        iii. Protecting the confidentiality of the resource.
    c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
    d. Protecting the resource. (Pub. Resource Code § 21084.3 (b)).
    e. Please note that a federally recognized California Native American tribe or a nonfederally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code § 815.3 (c)).
    f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code § 5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An environmental impact report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:
    a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code sections 21080.3.1 and 21080.3.2 and concluded pursuant to Public Resources Code section 21080.3.2.
    b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.
    c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code section 21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code § 21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code § 65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code § 65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code section 65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code sections 5097.9 and 5097.993 that are within the city's or county's jurisdiction. (Gov. Code § 65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
    a. If part or all of the APE has been previously surveyed for cultural resources.
    b. If any known cultural resources have been already been recorded on or adjacent to the APE.
    c. If the probability is low, moderate, or high that cultural resources are located in the APE.
    d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
    b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:
    a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.

b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
   a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, section 15064.5(f) (CEQA Guidelines section 15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
   b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
   c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code section 7050.5, Public Resources Code section 5097.98, and Cal. Code Regs., tit. 14, section 15064.5, subdivisions (d) and (e) (CEQA Guidelines section 15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions, please contact me at my email address: sharaya.souza@nahc.ca.gov.

Sincerely,



Sharaya Souza
Staff Services Analyst
cc: State Clearinghouse

From: Ronald Cheek
To: Rochelle Henson; smcmurtry@denovoplanning.com
Subject: Notice of Preparation - Oakwood Landing Project
Date: Wednesday, August 24, 2016 11:52:52 AM

Hi Rochelle and Steve
I reviewed the Notice of Preparation and find a significant error.
Figures 6,7,8 and 9 all improperly illustrate the Danna - Oakwood Trails existing General Plan an Zoning land designations. The uses were changed in June 2016 with Oakwood Trails approvals and need to be modified accordingly in this document. I look forward to continuing work with you on this project.

Ron Cheek
RLC Associates
1660 W. Yosemite Ave., Ste.3
Manteca, CA. 95337
(209) 239-5030

San Joaquin County
Environmental Health Department
1868 E Hazelton Avenue
Stockton, California 95205

Website: www.sjcehd.com
Phone: (209) 468-3420
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Willy Ng, REHS

September 15, 2016

Rochelle Henson, Senior Planner
Community Development Department
Planning Division
City of Manteca
1001 West Center Street
Manteca, California 95337

SUBJECT: Notice of Preparation of a Draft Environmental Impact Report for the Oakwood Landing Project

The San Joaquin County Environmental Health Department (EHD) is supportive of this project in regards to the provision of full public services. The EHD requests the following comments be added to the above project for consideration:

The EHD recommends that as a part of developing these properties, any existing wells or septic systems to be abandoned shall be destroyed under permit and inspection with the EHD.

The EHD recommends that the proposed construction of the potable water well, and any irrigation well(s), be conducted under permit and inspection by the EHD.

The EHD has reviewed the document described above that proposes rezoning agricultural property that is actively farmed to allow for residential and commercial projects. EHD recommends that additional research be conducted to determine whether pesticides were used on the proposed development site(s). The site(s) should be evaluated to determine if and where storage, mixing, rinsing, and disposal of pesticides may have occurred and whether contamination exists.

In addition, although EHD does not regulate pesticides legally applied to crops, if pesticides have historically been used on the property, we strongly recommend that these areas be tested for environmentally persistent pesticides such as organic pesticides and metals prior to development. The results of any testing should be evaluated to determine if concentrations present in soils will be protective of residents and workers.

If you have any questions, please call Frank Girardi at (209) 468-3420.

Rodney Estrada, REHS
Program Coordinator

September 16, 2016

VIA EMAIL

City of Manteca Community Development Department
1001 W. Center St.
Manteca, CA 95337
ATTN: Rochelle Henson

Re: Comment letter in response to Notice of Preparation of a Draft Environmental Impact Report for the Oakwood Landing project

Dear Ms. Henson,

My name is Lucille Harris and I am an authorized representative for Terra Land Group, LLC ("TLG"). TLG owns approximately 230 acres with almonds currently being farmed west of Airport Way and south of Woodward Avenue.

The TLG farm property is further described as consisting of one legal parcel with assessor's tax computation parcel numbers identified as:

1. **APN 241-330-32 (203.33 acres)**
2. **APN 241-330-33 (17.14 acres)**
3. **APN 241-320-60 (10.13 acres)**

Total Acreage 230 acres (approx.)

TLG is in receipt of the distribution memorandum Notice of Preparation of a Draft Environmental Impact Report for the Oakwood Landing project.

At this time, TLG requests that protections are put in place for the proposed project to ensure the following:

1. Adequate stormwater retention facilities are designed and constructed into the project area north of the existing Reclamation District No. 17 ("RD17") levee to ensure that all stormwater can be collected and stored within the project area during times of (i) flood events similar or greater than 1997; and/or (ii) high river water elevation flow levels due to large volume water releases from the upstream reservoirs that may restrict or prohibit stormwater discharge releases into the areas or river system adversely affected.

2. Adequate amount of ground surface distance will be provided from land (development) side of the existing RD17 levee for any development related construction or excavation required for housing or development infrastructure to allow a sufficient open space buffer to accommodate effective flood water seepage drainage and/or any levee maintenance necessary (**See Exhibit "1"**); and

3. Development housing to be positioned and illustrated on any and all tentative and/or final subdivision maps in accordance with RD17 representations that levee non-developing area setbacks will not exceed a total distance of 20' from the existing waterside levee toe (**See Exhibit "2"**); and

4. Promote wise use of the floodplain as TLG is informed and believes is recommended in California Senate Bill No. 5 ("SB5") by ensuring that the existing RD17 levee remains at its current location (**See Exhibit "3"**).

Thank you.

Yours truly,

Lucille Harris
for Terra Land Group, LLC.

LH/jas

Exhibits:

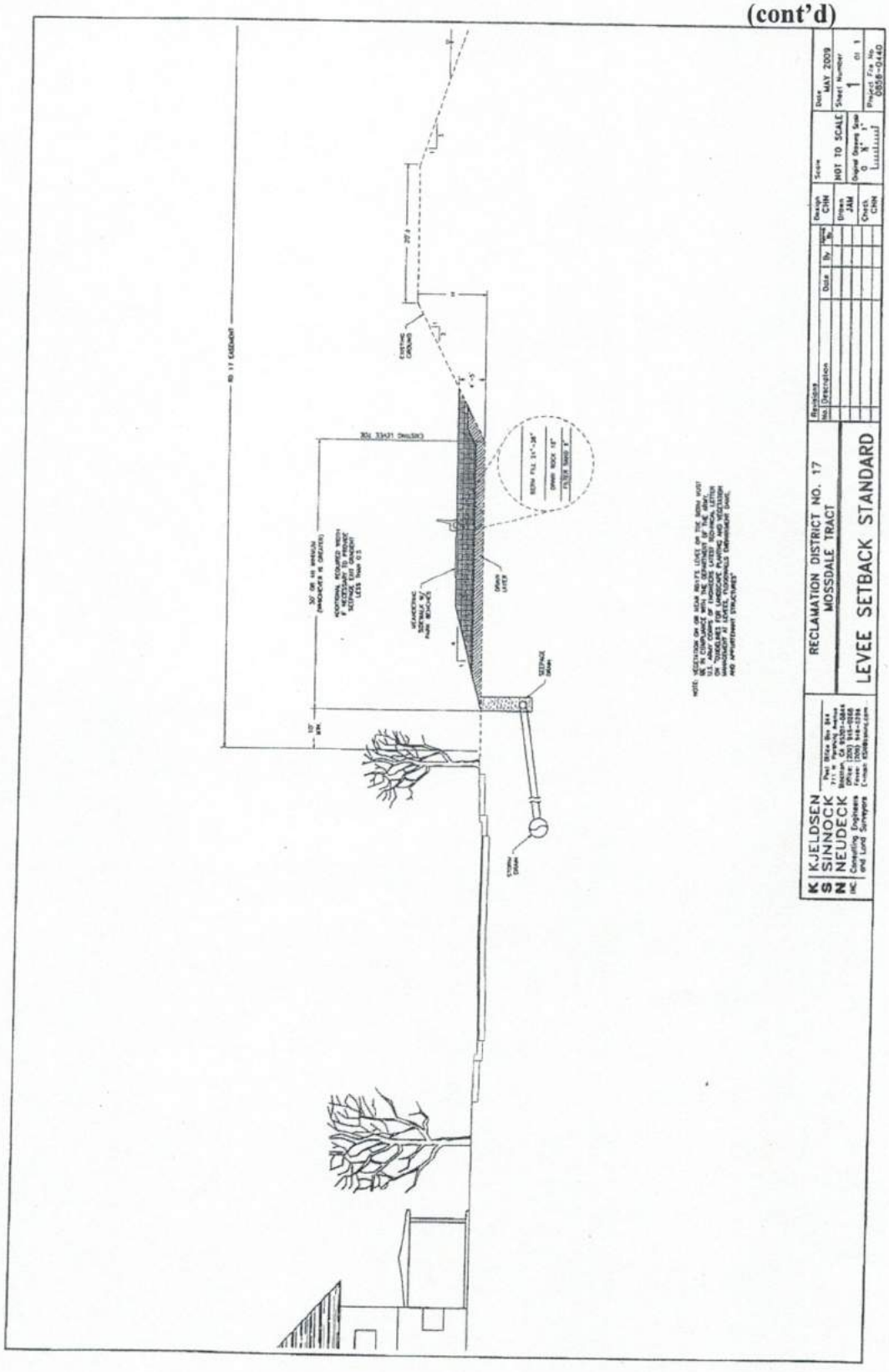
1. Ex. "1": 03/2011 Terra Ranch Subdivision Final Environmental Impact Report (SCH# 2010072054) Prepared for by the City of Manteca, page 3-32, by Raney Planning & Management, Inc.

2. Ex. "2": 03/2011 Terra Ranch Subdivision Final Environmental Impact Report (SCH# 2010072054) Prepared for by the City of Manteca, page 3-28, by Raney Planning & Management, Inc.
3. Ex. "3": 08/16/2016 Manteca City Council meeting transcription, pages 62-130, by California Deposition Reporters

Ex. "1":

Ex. "1": 03/2011 Terra Ranch Subdivision Final Environmental Impact Report (SCH# 2010072054) Prepared for by the City of Manteca, page 3-32, by Raney Planning & Management, Inc.

Letter 7
(cont'd)



Ex. "2":

Ex. "2": 03/2011 Terra Ranch Subdivision Final Environmental Impact Report (SCH# 2010072054) Prepared for by the City of Manteca, page 3-28, by Raney Planning & Management, Inc.

From: Nomellini, Grilli & McDaniel PLCs [mailto:ngmplcs@pacbell.net]
Sent: Wednesday, December 29, 2010 4:48 PM
To: Durrer, Erika
Cc: 'Chris Neudeck'; Stone, Jim
Subject: Terra Ranch Subdivision DEIR Sch# 2010072054

Letter 7

Erika Durrer: Reclamation District No. 17 submits the following comments. Attached please find copy
7-1 of May 19, 2009 letter from Kjeldsen, Sinnock & Neudeck, Inc to Mark Meissner commenting on the preliminary tentative map for the Trails e project which are relevant to this project as well. Such comments are incorporated herein. Since such comments were submitted the setback required by DWR
7-2 and the USACE has increased from 10ft to 15ft and poswibly 20ft. The RD 17 Levee Setback Standard should be adjusted accordingly. Engineering and O&M requirements are evolving and becoming more rigid. Excavations for swimming pools and other purposes outside the levee easements are increasingly being recognized as having the potential for affecting under seepage and therefore levee stability.
Location of ample open space along the levees coupled with a single loaded street as a buffer from
7-3 development is highly recommended. The Terra Ranch plan appears to incorporate the single loaded street and a setback. The setback may have to be increased and excavations as far as 300ft may be restricted. The single loaded street with an adequate setback will add flexibility to accommodate future levee requirements, avoid conflicting encroachments and improve access for patrol and floodlighting.
7-4 Thank you for your consideration. Dante John Nomellini, Secretary and Counsel for Reclamation District No 17

Nomellini, Grilli & McDaniel
Professional Law Corporations
235 East Weber Avenue
Stockton, CA 95202
Mailing address:
P.O. Box 1461
Stockton, CA 95201-1461
Telephone: (209) 465-5883
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Email: ngmplcs@pacbell.net

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Ex. "3":

Ex. "3": 08/16/2016 Manteca City Council meeting transcription, pages 62-130, by California Deposition Reporters

MAYOR DeBRUM: Is there a second?

UNIDENTIFIED FEMALE SPEAKER: Second.

MAYOR DeBRUM: The property moved and seconded on item C1. All in favor, signify by saying aye.

(Councilmembers responded aye.)

MAYOR DeBRUM: Opposed, same sign. Motion carries four to zero. We now move on to item C2.

UNIDENTIFIED FEMALE SPEAKER: Receive presentation from Drake Haglan & Associates and approve alternative 2A as the preferred alignment for the dryland levee and advance the preferred alignment (sic).

MS. REYES: Mayor and Councilmembers, the city has been very diligent in its efforts towards adequate progress as it relates to SB 5, and this presentation will be given by Matt Satow, the consultant from Drake Haglan & Associates.

MATT SATOW: Good evening, Mayor and Council. Good evening, everyone. So tonight before I get to the actual recommendation, I wanted to go back a little bit, talk a little about the project's background, talk about how we got to this recommendation.

So I'll start with the SB 5, and I understand you folks have a lot of items in front of you over the past years about this, so I'll keep this

fairly brief, but as you know, in 2007, a series of bills that we refer to them as SB 5 was passed by our state.

Essentially, a lot of this was in response to what happened in 2005, which was Hurricane Katrina. The state was trying to minimize their -- the amount of potential loss of life, property damage in a major storm event, so it established in the Central Valley some standards for level protection. We refer to it as 1 in 200 chance of it occurring in any given year. We call that the 200-year storm event.

Important to mention that that's, again, not something that happens every 200 years, but in any given year, a 1 in 200 chance of this type of event occurring.

Again, the background behind this, though, is to try to encourage cities in the Central Valley that were affected by this to take this into account in planning to try to minimize the amount of new development within the floodplain areas, and so as you know, you've been working towards this adequate progress.

Until July, I believe, you had an item before you move forward with adequate progress. Where this backs up to our part of it was that as this was

moving forward, the council recognized that there were concerns that the alignment alternative that was looking -- that was being looked at for Manteca in particular to extend the Reclamation District 17 levee may not have met the needs of the community, and so there was -- that's where we were brought onboard to try to reach out to the community, do some community workshops to see if we can find an alignment that can be agreed upon.

The Reclamation District 17 we're talking about is shown here in purple, and the area, if you look at the entire floodplain area, you can see right in the middle there, that that's the State Route 120.

The area that we're trying to take out of this is the area that's bound by Reclamation District 17, and you can see that by providing and extending the levee and providing some other levee improvements, that this group Lathrop, Stockton, Manteca is working on, you can provide that level of protection, the 200-year protection within that area, so, again, along with this project, I think the council recognized that there's another part of this that wherever this levee extension goes in the south, there's also the extension of McKinley Expressway, now known as the Antone Raymus Expressway that they need to be planned where that

alignment went, and so, again, part of our task originally was to look at how these two work, where does the alignment expressway go, how does that levee get extended, how do those two mesh together or can they mesh together, so we started with the mailing list area, and you'll see here, you can see in red the city limits.

Also, that blue area goes all the way down to essentially the city's sphere of influence, which goes down to Nile Road. That was essentially the mailing notification area because that would also cover where the potential expressway alignments went, as well as the potential levee extension area. There's about 850 or 900 or so mailing notifications were sent out as part of this.

The first public meeting -- again, we try to give some background on the project, you know, answer questions, and tried to bring together to see -- bring out some ideas and bring out some input into where the potential expressway and levee alignments could go.

I could say, and as you know, the first meeting, there was quite a bit of resistance to the expressway portion of it. There were a lot of questions, as far as you heard here on previous

presentations tonight. With the economic downturn, how did things change to the point where there was an expressway still needed in the same location, a lot of questions, and so as such, your council on April 5th took action saying to essentially look at the expressway alignment and all of those questions and try to answer those questions as part of your general plan update when additional traffic, when additional information would be available, so the direction at that time was to essentially take that part of the project looking at the expressway out of our section of it and solely focusing on the levee extension, so at the next public meeting, we did convey that to folks, that we'll be looking at the levee extension.

We looked at some various levee alignment alternatives and answered questions to folks, more of an open house style presentation.

In between the public meeting number two and three, there was certainly a lot of questions that were submitted through either the website or written questions to your council or letters to us directly. Between meetings two and three, we tried to take the opportunity to come back and answer those, and we provided those in writing. Our website was our primary method of conveying this information to folks, so we

had a fairly large e-mail list that we would use, and when we updated that information on the website, we'd e-mail folks and let them know, and so we did post frequently asked questions to the website, which tried to take every question not only received on the website, letters to your council, previous year's letters to your council. We tried to do our best to answer those.

Meeting number three, we went over those, a few of those in a little more detail. We went over the alignment alternatives being considered, and we tried to compare those side-by-side with some different factors, so I want to talk a little bit about the factors.

First of all, as I mentioned before, our primary goal in this project after the April 5th meeting was to see if we could build stakeholder consensus on a preferred alignment for the dry line levee that tried to meet stakeholders' needs, as well as the overall need that complied with Senate Bill 5 and state's requirements. That was our goal.

As part of that -- and this came from feedback at public meetings. This came from your council meetings from folks that have spoke. It also -- just interviewing stakeholders, we came up with

the guiding principles, essentially our constraints on this project, and you can see here, we tried to minimize impacts to farmlands, minimize impacts to the property owner access, stay on property lines as much as possible, use existing easements to the greatest extent we could, and then respect the right to farm, and, again, I know that you've talked about this at previous council meetings.

I'll just clarify, right to farm is again trying to ensure that whatever improvements and wherever the levee is proposed to go, that this doesn't impede folks that are farming out there or their ability to farm that land, that we're not blocking access for them to move farm equipment from one side to the other, not necessarily referring back to the law right to farm, but more in that lines of just ensuring that the folks that are using the property can still use it for that same purpose, accommodating entitled properties and consensus among stakeholders, of course, and then one of the more important ones, too, is really meeting that Department of Water Resources criteria for the wise use of floodplains, and then cost.

Now, cost, because the funding is, you know -- and we have a plan in the adequate progress. You have to have a finance plan. However, as you know,

it's very difficult.

Although there's funds identified, it's going to be very challenging to fund a project of this size, not only the levee extension but the overall improvements. This is combined with the improvements of Lathrop, all the RD17 improvements estimated to be somewhere up in the 180 to 200 million dollar range, so as part of that, it's important that we try to make this consistent with the Department of Water Resources' criteria to bring in the state potentially funding sources and also federal funding sources, and this really came from -- straight from Water Resources, the Department of Water Resources, in a letter to Lathrop.

They conveyed in writing what were their requirements to bring this project in for them to be able to support this for either state or federal funding. They mentioned the specific legislation of policies that they're following, the Senate Bill 5, the Central Valley Flood Protection Plan of 2012, Governor's California Water Action Plan of 2016, and federal executive orders, and they reiterated the fact that in order for them to support, again, this project for either state or federal funding, they would have to be in compliance with these.

They gave more specifics, again, outlined

more specific guidelines and principles of what they're trying to accomplish with this, and many of these have already been mentioned before.

It's essentially no increase in loss of life and expected damages. They want to show a significant reduction in these things with any project that they fund with these funds, and ultimately, they want the project to be backed -- to have federal interest in this project, again, to be able to bring in some additional funding for this, so when we got to the alternatives, we looked at about six different alternatives, and this alternative really looked at what's the cheapest and path of least resistance.

You're coming across not exactly where the existing levee -- a little bit forth of the existing levee where it leaves off and extends due east. This alternative, although inexpensive, really had a lot of issues with property owner access, how they use their property. It really did not have consensus.

When I say, consensus among stakeholders, in this case, it really did not have consensus among the folks who lived in that vicinity of where this extension was going through.

Alternative 1A is what was looked at, in terms of finding of adequate access. This, again,

extends the levee off of the existing terminal point and heads directly east now.

Again, in the -- in your finding of adequate progress, this went all the way to Union Road. It likely would not have to go that far. It likely would have to leave off probably at Oleander.

Again, this alternative, it did cut through a lot of property lines. It had a lot of access issues, and, again, consensus among stakeholders. One of the other things, too, just north of this just a little bit east of Airport and just south of Peach, you have a property that the school district, of course, is planning on building a school on in the future. This would cut through that property and not provide protection for that property in the future.

That was -- they are certainly a stakeholder in this, and so that was one of the concerns, as well. Alternative 2 was brought up at the public meeting, and alternative 2, as you can see, takes off from existing point on the levee. The point where it takes off on the levee out there, it's probably about 14 feet high.

It's a fairly large portion of the levee out there, although this alternative probably minimizes the impact to the person who farms it and has some

benefits. The fact that we're not using the existing levee out there, that's probably about a 3 to 4 million dollar piece that we're not using of existing infrastructure out there, right-of-way, as well as the additional land that you can see that from the north of the red line, it opens up another hundred plus acres for potential development, which could be inconsistent with -- again, the Department of Water Resources, what they're trying to do, they're trying to not open up additional area like that for development, and, also, one of the things of alternative 2 is the cost of that.

Because you're not utilizing additional levee because you're creating a lot more levee with it, your cost is up there near 25 million or so for this alternative. Alternative 2A, again, was -- again, not utilizing all the levee, but it's still utilizing quite a bit of it. It's coming across down south off of that point on essentially what I would call high ground out there.

The property that it's coming out on right there is probably a good 2, 2 and a half feet higher than the property to the west of it, and so you're gaining an advantage by being a little bit higher up. You're coming down and you're following essentially along -- there's an irrigation district drainage canal

there that you can follow along that canal.

We can always open up discussions with the irrigation district, as well, as far as acquiring some of that right-of-way. Whether or not that's possible, we can identify, but at least it follows an easement line there. It jogs up along the property line just north of Fig, and it goes all the way down to Oleander.

Alternative 2A met pretty much all the criteria, except for, again, utilizing existing easements. With all the alternatives, nothing completely uses all the existing easements out there.

As far as consensus among stakeholders, what I'll say about 2A is that it -- just, again, full transparency, I didn't have a lot of people saying exactly with 2A, we want 2A. A lot of folks, we gave them the option, instead of saying vote for an alternative, we said, "If there's alternatives you absolutely do not want, please convey that. Any feedback would be helpful."

A lot of the other alternatives had folks saying absolutely not. Alternative 2A had the least amount of people saying absolutely not to 2A, and there were some folks that came out through the website and through e-mail and phone calls that did support 2A, as well, though.

Alternative 3, again, was another alternative of coming off the existing levee and coming really far south now. Alternative 3, as you can see, it's a lot of levee you're constructing out there. There's a lot of open area to the north out there that they're opening up.

Two things stand out right away. One is that it's really difficult to make that fit the Department of Water Resources' criteria for minimizing the amount of development that you could be opening up potentially. I will mention that one way of doing that if this alternative were selected in the end, properties to the north of that, if they were to put their properties into farmland, conservation easements, the city would have to acquire those.

It could be very expensive to do that, but that could satisfy Department of Water Resources if you were able to do that, but you're talking about hundreds and hundreds of acres that you would have to go acquire with farmland easements to prevent that.

The cost of this project without even doing that is closer to 30 million dollars. This alternative, I won't spend a lot of time. It was brought to us, again, by someone at one of the workshops. They were just essentially trying to stay

along irrigation district easements coming down and following those for the most part.

This doesn't mean a lot of the different things that we're trying to do. Obviously, it opens up a lot of land. The cost alone was about 52 million, and it really didn't have very much consensus. There were a lot of folks that came out and said absolutely not to this alternative.

Alternative 5 was also looked at, at one point. I understand, and so we brought this one in. This follows along the east part of Airport, heads south to the same part along the property lines to the north of Fig.

This alternative, although inexpensive, it really had a lot of property owner access issues along that east side, and then as far as consensus among the folks who are in the vicinity of this, it had virtually zero support from the folks in that area, so in the end, when you put them all side-by-side and you take a look at, based on those criteria, which ones had, we'll call them, fatal flaws or did not meet the criteria, as far as the others, one stood out as being kind of the compromise.

It certainly wasn't the cheapest alternative, but it certainly was within reason. It

was something that they could build into the finance plan, as well as it did not have anything that really did not meet the criteria, and that was 2A.

2A is the alternative again that comes across the high ground off the existing levee and then heads east just a little bit north of Fig, so that is our recommendation, and moving forward -- now, again, what does this recommendation mean at this point? I really want to be careful about this because this is just, again, a recommendation to move this forward into the next part of the study, which would be the environmental portion of this. The environmental study is going to look at a lot more detail, a lot of these things.

There's been a lot of questions not only between meetings two and three, after meeting three to try and answer, but again, there are some things that are going to have to wait to get into the environmental process that you answer as you start doing more detailed studies on this information.

This is one alternative that will be studied. There will be an (Inaudible) study as standard with environmental, and there may be variations of this alternative that could be studied, as well, to help try to minimize additional impacts.

This is really the first step, and as you can see in the schedule, the environmental process is anticipated to start in 2017. That environmental process is going to take probably close to three years to complete.

By the end of the environmental process, your council will be asked or the government body who is overseeing this project will be asked for a preferred -- determine a preferred alignment at that time to move forward for the final selection, so the action tonight, I want to clarify again, is not the final action on this project.

It's not the final alignment. This is to take the next step to move forward into the environmental study, which other alternatives will be studies, as well. All that will lead into, again, 2020, 2021, so when final design, right-of-way acquisition will be occurring with the ultimate goal of having this constructed by the Senate Bill 5 by the year 2025.

With that, I'd like to open up any questions of the council.

MAYOR DeBRUM: Any questions?

UNIDENTIFIED MALE SPEAKER: Just a quick confirmation. 2A, which is recommended, would end at

Oleander?

MATT SATOW: Based on the information we have right now, yeah, yes, that's where we believe it would end.

UNIDENTIFIED MALE SPEAKER: So it's one of the shorter routes --

MATT SATOW: Yes.

UNIDENTIFIED MALE SPEAKER: -- as far as going east?

And, of course, the EIR would be -- environmental impact report would have to look at all those factors, as well?

MATT SATOW: Correct.

UNIDENTIFIED MALE SPEAKER: Okay. Thank you. No more at this time.

MAYOR DeBRUM: Questions?

COUNCILWOMAN MOORHEAD: 2A is 25 million dollars; is that right?

MATT SATOW: 12.1 million for 2A. Alternative 2 is 25 million.

COUNCILWOMAN MOORHEAD: That's what I meant, yes.

MAYOR DeBRUM: Anything else? Anything else?

COUNCILWOMAN MOORHEAD: No.

MAYOR DeBRUM: So, in essence, there's a starting point --

MATT SATOW: Right.

MAYOR DeBRUM: -- as we move the process forward?

We're going to have to go through the EIR, but that's just what our CEQA process, the NEPA process through the -- all the information that will be state-driven that will mandate itself what we have to look at, this process, which will begin in '17 probably completed in 2021, and then we'll go from there.

MATT SATOW: Correct. And just to clarify, too, this is from staff, as well. CEQA, at the minimum -- that's California Environmental Quality Act. NEPA, if there are federal funds involved on this project, if there's one dollar of federal funds, we're going to do NEPA, as well, on this. Both are very similar processes.

MAYOR DeBRUM: Right.

COUNCILMAN SILVERMAN: I have a question. Is the levee extension expected to be a separate EIR from the levee improvements, the rest of RD17?

MATT SATOW: I believe that's the way they've been implementing that. Kevin could even elaborate on that or even Dave if that's....

UNIDENTIFIED MALE SPEAKER: It's the same document.

MATT SATOW: Yes. Oh. It's the same document

they're moving forward on now -- moving forward the same document. All right.

MAYOR DeBRUM: I'm sorry. I didn't get that.

MATT SATOW: No. I was sort of juggling it myself, but --

MAYOR DeBRUM: (Inaudible) -- please.

MATT SATOW: So I'm sorry. Right now, it's moving forward in the same document to study those. It would not be a separate document for that.

MAYOR DeBRUM: Okay. All right. No other questions out there? And do we have speaker slips?

UNIDENTIFIED FEMALE SPEAKER: We have several speaker slips. We'll start with Raymond Quaresma.

MAYOR DeBRUM: Mr. Quaresma?

RAYMOND QUARESMA: Good evening.

MAYOR DeBRUM: Good evening.

RAYMOND QUARESMA: Good evening, Council. Thanks for having me. I feel at peace. I feel that the prayers, the nice prayers of (Inaudible). I have an appreciation for developers, those that are good. I really like that. I like investment.

Sue and I took a family photo. It's almost a hundred years now, and we just keep growing with it. We're almost up to 600 head, and we had to comply with all the regulations. It's not been easy, but tonight I

want to speak on life and what's just and what I think is good, and my heart is there, and what I think is right and what I think can be wrong.

I have a hard time with the Drake people, I really do. It just seems so manipulative and so incorrect because every time they would come to us, and then we'd put a concern, and they would change it. Oh, yeah, you might be right, it's got to go up a little bit more; oh, yeah, you might be right, it's got to go up a little bit more.

But we have a lot to lose out in agriculture. It's an oppression on us, and you guys have a lot of authority to make the right decision, so in respect to developers, in respect to nature, in respect to people, in respect to community, in respect to state authority cost and responsibilities, and respect to the authority of the United States and all engineering, this is where I'm asking you guys to put your own conscience.

I hope it's not boring, I hope it's something that makes a lot of sense to you. I got a chance to work with a couple of good old men, Alex and Mike Zekas (phonetic) for a lot of years, and we really respected the reclamation districts in San Joaquin Drain and just the force that could come there, and you

don't want to mislead people, so I don't think this is the right area to put houses, I really don't.

It's a good area for other things the city can use. It's a valuable area. There's an oppression on the old historical ordinances, ways, and respects of life.

The Drake people keep saying we've got nothing to worry about. 27 and a half elevation in 1997. There's not going to be no change. There's not going to be no change.

There's this common sense thing that God gives us that why do we got to put up all this and start at 140, 135 million. Now we're up to -- the words keep changing. Now we're up to 180 million, maybe 200 million. Somebody has got to pay that cost. Can I go on?

MAYOR DeBRUM: Yeah.

RAYMOND QUARESMA: So I'll just -- I don't think -- I'll bring this to a head. I just don't think it's the right place, and you guys are going to make the decisions.

We're going to have to live with it, but the water has got to go somewhere, and I just ask you to put a conscience to that. Thank you.

MAYOR DeBRUM: Thank you, Mr. Quaresma.

DEE WACKERLY: Dee Wackerly.

MAYOR DeBRUM: Mrs. Wackerly, good evening.

DEE WACKERLY: Mr. Mayor, Councilmembers, good evening. My name is Dolores Wackerly. I live at 50 East Fig Avenue in Manteca. 3 minutes is not nearly enough time to convey our concerns and anxieties of things which will greatly impact our lives.

I'm speaking, of course, of crosstown levee in particular, although somehow this project has now overshadowed -- overshadowed our main concern over the years, and that is the Raymus Expressway, and I will state again that I'm against both. What I would like to say at this time, though, is that aside from the irresponsibility of the Mayor and the Councilmembers to approve this very expensive levee project just in order to continue building in a known floodplain, you have obviously ignored the concerns of the people whose very lives will be greatly affected.

We have taken our time to be involved, have spoken at these council meetings, have given you reams and reams of letters and documents showing the negative impact of these projects on our homes, farmlands, and livelihoods, and you have not given us due consideration for any of this. It is so unfortunate that so few people can make such major decisions for

such a multitude of people.

Regarding the workshops as was mentioned earlier, you allowed us three workshops with a consultant to give an overview of the expressway and levee and allow us to ask questions.

Well, very clearly, there was a bait and switch scenario that took place. After workshop number one, at the next council meeting, you decided it would be in everyone's best interest to take the expressway out of the equation and for the consultant to concentrate solely on the levee project, so at workshop number two, questions and answers were aired solely on the levee project. We were also told that at workshop number three, it would be announced which alignment for the levee would be recommended to council.

As you can see, there really was not much time spent discussing the expressway. Levee concerns was only recently thrown into the equation, so, yes, there very clearly was a bait and switch scenario that took place, and unfortunately, we have no idea what is happening with regard to the Raymus Expressway.

It's in limbo, I guess. This consulting firm cost the city $92,000 for the study. The consulting firm used by the city in 1993, the public facilities implementation plan, cost the city $860,000

for basically the same study.

I'm almost through, if that's all right. Our city leaders will pay out thousands and thousands of dollars to listen to what outsiders have to say or what they think is best for our city, but they don't take into consideration the needs of the people who live here.

One other thing that has weighed heavily on my mind is protocol at our City Council meetings. In particular, it is unclear to me as to why you as Mayor and Councilmembers cannot answer questions on the spot, which we bring to you regarding a particular agenda item.

There is probably something in writing regarding council meeting protocol and why questions cannot be answered at the time they are asked. If you'd be so kind as to point me in the right direction in obtaining such a document, I would truly appreciate it. Thank you for your time.

UNIDENTIFIED FEMALE SPEAKER: Bruce Perkins?

BRYCE PERKINS: Thank you. It's Bryce. Quickly, I've got a letter here that was presented to Lisa yesterday. You should have it on a CD for request to the council, so those should have been provided at 1:00 o'clock yesterday. There's a few people that were

left out so -- (Inaudible) Lisa. I guarantee I'll take 4 minutes, okay?

I appreciate Matt's comments that farmland is going to have access to -- what I'm addressing tonight, it's pretty important that we have access across the levee as the levee undergoes changes, and I did hear Matt's pledge that farmland would be -- would be accessible still, and that's what we're here to talk about tonight from my standpoint.

Continuing, my name is Bryce Perkins. I'm a member of the TLG Land Group. We've been made aware that a dirt roadway used by the public for many years originated at Woodward Avenue extending south of the current levee crossing has been utilized by TLG, RD17, RD17 contractors, and others to access various property interests.

Public dirt roadway is what my text refers to. I've learned over the years, don't miss a meeting. I'm on a couple of committees myself. They might put me on a subcommittee or name something after you, and for lack of a better term, maybe I'll call it Hernandez Road tonight, and maybe you'll know what I'm talking about.

It starts at Woodward. It goes straight through on the McKinley extension, okay, and then

continues on to Manteca's only rural property out there, our 230 acres, and ends out there at the far end of our property, so it's a very distinct road, a big dirt road, so Hernandez Road goes out that way, all right?

It's about to be relocated to a different alignment which may prohibit the public and RD17, as well as many other municipal and other emergency response vehicles from accessing and traveling to the far side of that levee.

Hernandez Road is a public dirt roadway currently is described in a number of exhibits. You've got them in the letter we've sent you, and you'll find them in Exhibits 4, 5, 6, and 7, and by the way, I might add at this point that that public dirt roadway that I jokingly call Hernandez Road is identified in the San Joaquin County revised public road map No. 57, so it's out there. It's on your maps if you go look at your public road map.

Most important, TLG has been informed and believes that in January, 1997, RD17 trucks and emergency flood response vehicles responded to San Joaquin River Valley levee breach by hauling rocks over the public dirt roadway, Hernandez Road, from Woodward Avenue to the RD17 levee to perform emergency

flood repairs and reinforce that levee to protect this community.

It is for this reason that TLG believes that the City of Manteca should consider the City of Manteca, that if the City of Manteca prematurely abandons the public dirt roadway at its current position, how and by what means will emergency response flood vehicles respond, access and in future flood events resulting from a breach in that area? And there's been a number of breaches in that same area.

In addition, if only -- if the only current reliable access to City of Manteca-governed properties -- and we're a governed property out there -- south of existing RD17 is along the same public dirt roadway running south from Woodward Avenue and to and over and along the top of the RD17 levee, how will fire, police, emergency vehicles access that property, for one, affect an infrastructure, two, any public or private employees working on properties located with the City of Manteca and to respond to grass or brush fires?

In addition, TLG has observed and continues to observe pedestrians are out there now. They're out there walking on RD17 levees. They're out there walking on SSJID easements. How does the City of

Manteca fire services, public police services respond to emergencies with those people?

There's a lot of truckers out in that area now, and that access road is how they get there. With this in mind, by what means the City of Manteca responds to a medical emergency is important. These concerns are for justifying and protecting the public's rights.

The road along -- road access along the current location of the public dirt roadway extends to RD17's continuing need to maintain the current dryland levee to eliminate any current and continuing flood risks, developed, and undeveloped properties north of the RD17 levee.

With this in mind, TLG would like to call your attention to recent and very significant levee repairs associated with that levee, which TLG occurs on or about December, 2013 by an RD17 contractor, DA Archer Excavating. That makes TLG question how can anyone possibly consider a lease until adequate, sufficient alternative roads are provided interrupting the public's use of the current public dirt roadway when it is considered the public dirt roadway is dependent upon and currently utilized by public agencies, contractors involved in various forms of

maintaining the levee currently in place in any members of the public looking to inspect the same?

For these reasons, TLG believes accommodations should be made to allow the continued use of the public dirt roadway at locations currently in place and support adequate and continuing protections of any and all rights enjoyed by the public on that roadway. Thank you.

MAYOR DeBRUM: Thank you.

UNIDENTIFIED FEMALE SPEAKER: Martin Harris?

MAYOR DeBRUM: Mr. Harris?

MARTIN HARRIS: Good evening. Thanks for the opportunity to be able to speak tonight. My name is Martin Harris representing Terra Land Group. Yesterday Terra Land Group submitted a letter to the Manteca City Council in association with agenda item C2.

At this time, I would like to present an excerpt from that letter relating to flood impacts and responses to questions submitted by Michael Fonseca.

In this way, Terra Land Group continues its efforts to support minimizing impacts, rather than alignments. Upon careful review of Fonseca question response attachments in C, as well as Fonseca question number 10, it appears that both flanking and overtopping of the current levees will occur at or

about 29 feet. This will be kind of technical. In addition, Terra Land Group is informed and believes that flood water elevations experienced from 1997 at no time came close to either flanking or overtopping based on a relief cut being made to the San Joaquin River levee system at or near Turtle Beach. This is supported by water contra lines detailed in Fonseca question response attachment A, which is an OES map done in 2011 that mapped out the impacts from the 1997 flood.

Further, Terra Land Group believes this to be fully consistent with the previous information presented by Terra Land Group and the letters being presented tonight.

Of special concern is that with the inclusion of various Fonseca questions into this dryland levee public hearing process, Terra Land Group cannot see how any member of the public, including Manteca councilmembers can adequately understand the full scope of the various possibilities for flood water impacts likely to occur.

In addition, yet another set of Fonseca questions dated and submitted August 8th, 2016 and the associated response that have just been received earlier this morning were presented by e-mail from

Terra Land Group to the City Council earlier this afternoon and caused Terra Land Group to believe that the latest responses only add confusion and uncertainty.

Further, Terra Land Group believes that any future decisions made by any and all governing authorities relating to management of water storage and releases from the Don Pedro and Melones Reservoirs could also add to the total impacts created.

For this reason, Terra Land Group and other members of the public believe that it is important that the City of Manteca and other authorities involved place the greatest emphasis on ensuring that any significant increase in "with" project as compared to "without" project, flood, elevation conditions, will allow for mitigated measures to be put in place to reduce those impacts to less than significant.

This is particularly important when you consider increased storage and improved water management and flood prevention capabilities associated with the expansion of Don Pedro Reservoir in 1971 and Melones Reservoir in 1979, which causes Terra Land Group to believe redefines the public's understanding and reliance on future flood impacts to be expected.

With this in mind, it is Terra Land Group's

belief that the 1997 flood established a working model for flood impacts to be utilized in any future comparative analysis.

Terra Land Group further believes that the 1997 flood impact model is adequately demonstrated in Fonseca question response attachment A and most particularly with a 27-foot, 6-inch flood elevation line that is depicted, and that's that same 2011 OES flood map.

As a result, Terra Land Group believes that it is only reasonable to expect that any future impact analysis allows for a direct comparison of "with" project to "without" project conditions based on the 27-foot, 6 elevation impacts experienced during the 1997 flood. Thank you very much. I appreciate it.

UNIDENTIFIED FEMALE SPEAKER: Mary Ann Rawlins?

MARY ANN RAWLINS: Mary Ann Rawlins, 5880 East Fig Avenue. I'm not going to read the entire letter because it's just repetition about the SB 5 levee. Okay.

I'm going to take off here with, understand that this levee extension is not an Army Corps of Engineer levee nor an RD17 levee. This levee is only being extended off of the RD17 levee, 100-year levee and should be maintained by the Cities of Manteca,

Lathrop, and Stockton, if and when the City of Stockton decides to join the cities of Manteca and Lathrop in its endeavor.

Keep in mind, this extension is not being established for the existing homes in the 200-year floodplain, nor those new homes being built prior to or approved for building prior to July, 2016.

All those existing structures are hereby grandfathered. If no building is to occur within this area by the city, there is no need for the 200-year levee protection.

In my opinion -- in the opinion of myself and others, the City of Manteca has never been forthright with information regarding the proposed expressway, nor have they been straight to the point with information regarding the proposed dryland levee.

Information has been gleaned by a number of individuals who will be adversely impacted by this undertaking. Please note, requests for Dee Wackerly and myself, Mary Ann Rawlins, dated April 2nd, 2014, which used the Freedom of Information Act to obtain any maps regarding the proposed roadway, all the information we received to date is a single sheet of paper with no street names. This is highly inappropriate information, and does not comply with the

provisions of the act.

SB 5 was passed in 2007 with a number of amendments added to the bill and established the criteria of cities (Inaudible) by 2012. The City of Manteca met all these requirements.

The placement of the expressway and the dryland levee were to be done as a joint venture. It was not until the first workshop meeting held by Drake Haglan on March 30th, 2016 that the City of Manteca took the expressway off the table. City planners were then aware of the tentative placement of a dryland levee, and they had taken steps to meet the requirements prior to 2012.

Therefore, I would ask the question, why was there no mention of the proposed extension of the dryland levee and expressway at the time of our April 2nd, 2014 requests? They were being done hand in hand.

Landowners have repeatedly voiced their objections to this massive invasion and nuisance into the rural property south of Peach by attending meetings and writing letters (Inaudible) record of the various council meetings, but to no avail.

The City of Manteca is well aware, on notice of the expectant higher flood waters and additional flooding to those landowners south of the

proposed levee but still choose not to hear their voices and turn a blind eye to the concerns and known history of this floodplain.

The City of Manteca refuses to listen to the wise advice of the landowners who have experienced terrible flooding in the past. There are, in some cases, three generations of families who have experienced not just one flood but three major floods, '51, '55, and '97.

These individuals are whom the city initially contacted for their advice as to where the flood water went. Most recently was the time of the 1997 flooding. Yet, in this instance, they choose to ignore and defer to the affected parties' expertise. This speaks to the City of Manteca's foreseeability of the issues.

This is not an act of God, and their intentional willingness to ratify the deal knowing fully well that flooding will most definitely occur, this goes towards its accountability. If the city constructs or puts a hazard there and fails to properly maintain it and fails to ensure the safety of the adjoining landowners, they could be liable and held responsible for damages to life and property.

Government, no matter if it's at the

federal, state, county, or on our local city level, has its principal duty to protect all the people. Its purpose is not to put others at risk in order to correct bad, irresponsible decisions made by the cities for building an area where buildings should not have been permitted in the past and certainly should not be allowed in the future.

Government at all levels seems to make and change rules and policies for the benefit and not for those whom they were elected to serve. Responsibilities for their actions and any dire consequences made on self-motive by the City of Manteca and Lathrop cannot be tolerated. The cities absolutely should not hold rural landowners personally liable for their bad decisions. This letter serves to seriously inform, notify the Cities of Manteca, Lathrop, and Stockton that they will be held accountable for any devastating effects that results from their non-thinking and irrational behavior and planning. Thank you.

MAYOR DeBRUM: Thank you.

UNIDENTIFIED FEMALE SPEAKER: Alicia Guerra?

ALICIA GUERRA: Mayor DeBrum, Members of the City Council, I'm Alicia Guerra with Buchalter, Hemer. I am working with the local communities, the Manteca SB 5

developer group, and RD17 on developing this proposal for 200-year flood protection, and I wanted to comment on a couple of issues that have been raised this evening.

The first thing is, we're at the beginning of the process, and I think, Mayor DeBrum, you made the comment that this effort this evening is just to identify an alternative that can be carried forward through years of further studies, and, actually, studies have already been underway for RD17 with its levee seepage repair project, and the adequate progress findings that were prepared cover all of that, all of the efforts today to bring this area into a 100-year flood protection to continue to maintain a 100-year flood protection and to build from that to build for a 200-year flood protection.

RD17 has designed a plan that protects everybody to 200-year flood protection. It's not just about new development. It's about the existing 46,500 residents within the area, as well, within Lathrop, Manteca, unincorporated San Joaquin County, and portions of Stockton.

What is important is all of the local communities are working together, and they're working together in two different ways. One is to come up with

this plan which necessitates having some alternatives to study through the environmental review process and the permitting process, but they're also working with the State and Federal Government to try to get some funding devoted to these levee improvements to continue to provide flood protection from 2025 and into the future, but we all know the reality is nobody has money, and so this is going to be a very long and uncertain process.

So in the meantime, we are working now on trying to bring the plan forward, and that effort necessitates the identification of an alternative, and these local communities have come together with an MOU. They are starting discussions on governments and how to form an entity to carry this effort forward for the benefit of all of the communities and for RD17 as the levee maintaining agency, and in an effort to proceed with that, we need to be able to demonstrate to the Department of Water Resources and the Corps that we're working together on this wise use of the floodplain issue, and so this alternative that is brought before you today is going to be the first step in trying to do the studies needed to be able to demonstrate to the agencies that this process will proceed in an effort to provide adequate progress and in an effort to provide

200-year flood protection by 2025, so if anyone has any questions or has questions about the process, I'm available and would certainly be happy to address your concerns or questions. Thank you.

MAYOR DeBRUM: One quick question. Mrs. Rawlins indicated that -- and it's my understanding it's not all about what you just indicated. It's not all about new development. It's about protection of the entities that are out there, whether it's the County Jail, the County Hospital, the new VA Hospital, our sewer facility, everything. If not one house was built out there, would we still be required to put in a levee or maintain a 200-year flood protection system?

ALICIA GUERRA: If not one house -- so the requirement for 200-year flood protection applies to commercial and residential development.

In addition, we have 61 critical facilities located in RD17. Those actually are supposed to go to a 500-year level of flood protection. Well, 500 years is pretty onerous, and so right now, what RD17 is doing is try to flood-protect the area to 200-year flood protection.

We need, though, some new development to be able to fund this because it's expensive for the local communities, and RD17 doesn't have the resources to

fund these improvements, and so new development, whether it's residential, and we have industrial and commercial developers also working on this, are funding this effort so that everybody within RD17, the existing residents, the existing property owners benefit from that enhanced flood protection, so it applies equally to residential and to commercial development, as well.

MAYOR DeBRUM: Thank you.

MR. MOROWIT: Just to piggy-back a little bit on that. I brought that up in the past, as well. The Department of Water Resources has been very stringent about what they would like, and one thing they don't want to see is us to incorporate more land for development, so I'm looking at this alternative here, 2A, which has been recommended.

We haven't voted on it yet, but it's been recommended. We already have an existing RD17 levee in place, and this will be a slight extension of this, but I don't see it really particularly taking any more land, very minimal amount.

I think it's in accordance, so we don't, you know, do anything to existing property owners, but we really aren't expanding what we already have entitlements for.

I realize people might say, oh, there's no

homes there, why are we going around them. Fortunately, entitled -- correct me if I'm wrong -- means that they have been told that we have been entitled to build there already.

So what we're doing is taking the existing -- I realize existing looks like an empty lot, but it is existing. I mean, it is something that has been entitled by the city, so as hard as it is to see that because there is no homes there, it is -- and unless you can correct me, but we are basically staying within the guidelines of the Department of Water Resources.

I've attended a couple of meetings with them in Sacramento, and they just are completely -- don't want us to expand more areas and just say, okay, no, we want to expand it, try to get a little bit out of this because this doesn't get more out of it.

I know other alignments drop down farther south. This one doesn't particularly. It like piggy-backs on what's already there, so from what I understand and what I've been told, we just can't cut out what we're already entitled, and then we would be in a completely different situation legally.

ALICIA GUERRA: Council Morowit, you're exactly right. I mean, the discussions with the agencies have

been not even that. They don't recognize vested rights in the way that local communities do, so just because you have a development agreement or just because you have a vesting tentative map, to the State and the Feds, that doesn't mean anything, and under SB 5, that doesn't mean anything, particularly if you're a residential subdivision because the issuance of building permits are subject to the 200-year flood requirement for residential. The issuance or approval of development agreements are subject to 200-year flood protection.

In the discussions with the Corps and with DWR, they've said notwithstanding the local community's efforts to come together with a unified floodplain management initiative, which has been ongoing for the past year, actually two years, to try to further manage the level of development within the deep part of the floodplain, we've gone to those agencies and said in a couple of instances, Lathrop, for example, reduced the area within its sphere and wiped out some development.

We talked to them about what Manteca's efforts are through the general plan update process. We talked to them about what Stockton's efforts are to change their Village residential to a much less intensive, most likely agricultural, open space area,

and we've said -- we've put that on the table and said, we're not going to develop this 3200-acre area for urban development; we're actually going to reduce it, and they said, well, that's not really good enough, you still need to go back and show us -- notwithstanding vested rights, notwithstanding what is considered entitled to your point, Councilmember, you need to take some more land out, so when they understood Manteca was also considering the dryland levee extension, they said, Well, you can't put more land in because we told you, you just have to take more land out if you're going to go through this process, and all of this frankly isn't even to get an approval.

This is just to start the process with the State and the Corps of Engineers, so I want to assure everyone here that the decisions made this evening, we are so far away from getting an approval from anybody at this point.

This is just to start the process, so at the end of the day, you know, we're looking at probably having to shrink the level of development in this area, and that's the reality.

MAYOR DeBRUM: Thank you.

ALICIA GUERRA: Thank you.

UNIDENTIFIED FEMALE SPEAKER: Ed Fonseca?

ED FONSECA: Good evening. The project background that you were given this evening was the floods of '83, '86, '95, and '97. Well, I was in '51 and '55, so I'm getting up there in age, and a couple comments I'd like to make.

First of all, currently, Manteca has been acting on a, quote, adequate progress report, which allows developers to proceed on lots that the city has already created that is in the floodplain.

The City of Manteca is opening itself up to the biggest and most lawsuits they've ever even dreamed about if they allow the developers to continue and develop those lots that you've already created. Why? Because there's no mechanism for funding in place. The levee hasn't been decided for sure.

Let's go back to the '97 flood. There was water at the intersection of Fig and Oleander, and 2A proposes to stop the levee at Oleander. What good is that going to do you? You've been watching TV lately? You don't think the water is going to go right around that levee on Oleander, come right into the City of Manteca on all the houses that already exist?

You're not taking action on a levee to protect new construction. You're taking action on a levee to protect the existing City of Manteca, and you

think it won't happen. Have you ever seen 25 inches of rain in two days? You say it won't happen. Have you had your TVs turned on the last couple days? Have you seen how many thousands of people have been put out of their homes? You have a duty to protect the existing -- existing City of Manteca, not paper lots that you have approved in a floodplain when there is no plan in effect to control that 200-year flood plan. Yes, everybody is working on it, but there doesn't seem to be a consensus, no consensus on where the levee should go.

This report says that 2A won't affect any of the farmland. Well, it destroys one of our farms. Half of the land would be taken away by this proposed 2A levee. You say the City of Manteca doesn't support eminent domain. You're recording all of this, right, because it's going to come back to bite you in the butt because I guarantee you that Fonseca Farms is not prepared to sell land for a levee at the proposed prices that RD17 has thrown out there, which is ridiculous, not land that we farmed for years.

You want to talk about how many generations that go back with floods? Probably almost more than anybody else in this room. I was two years old in '51 standing on my dad's pickup barely looking over the

windshield to see the flood waters come in, and if you get a 200-year flood, that levee is not going to do any good if you stop at -- you need to go all the way to Union Road minimum.

I propose route number 3. Okay. So route number 3 affects, according to the draft, the least amount of property owners, okay? The only problem, it says that you're doing a land grab with that, but I don't think you're doing a land grab if you're protecting the City of Manteca.

Some people might say, well, you're doing it for your self-service because that would put your property on Airport Way inside the flood levee. Not true. We have other farm ground that we own that would be outside the flood levee, so, you know, I'm thinking of the city itself.

I'll probably never see it, being 67 years old, but if the water came to McKinley and Fig in '97 and you get a 200-year flood, the City of Manteca is going to see water in its city streets, city streets if you guys don't put your big boy and big girl pants on and do what's right, and you can't allow any building to go forward.

Screw this adequate progress being obtained. There's no adequate progress. There's no

decision made. There's no EIR.

How in the hell can you allow those paper lots to be developed? I mean, the amount of lawsuits that this city would take on if you allowed that construction to go forward and you did not have firm, solid plans made on how that levee was going to be done, and what -- what if the developers built those lots and then moved to New York? Who's going to pay?

There's no plan in effect. There's no signed documents. There's nothing but thin air. Adequate progress report is a bullshit comment to allow the developers to proceed when there is no solid plan in effect for this levee.

UNIDENTIFIED FEMALE SPEAKER: Michael Fonseca?

MICHAEL FONSECA: Good evening. Michael Fonseca, Airport Way. Originally, I wasn't going to speak tonight, but I had to come up and just make a little clarification. You know, I missed their name. I believe she is the legal counsel for the Manteca Development Group.

It was clever how she deflected your question, Mayor DeBrum. You asked the question if the levee would be required if not another house was built within the 200-year floodplain. The SB 5 law states that the 200-year protection is only required if the

development occurs within a 200-year floodplain.

It does not -- it is not directed towards existing infrastructure, existing people, or anything developed outside the 200-year floodplain, but I appreciate her deflection with that answer, so while I'm up here, if it's that important to protect the rest of the existing infrastructure and population of Manteca and Lathrop and my land is needed to ensure that protection, why is there such an effort to devalue my property?

Why -- why is not the property owners respected? My land is being taken from me, my use is being restricted, but that's not taken into account.

The only thing that's taken into account is how cheap you can get it. That's not right.

I know it's recommended that the councilmembers don't engage in conversation with the speakers. By a show of hands, how many people -- how many of the members up there access the Raymus -- the Raymusexpresswayplan.com website in regards to the dryland levee, that map Drake Haglan & Associates periodically puts updates on? So seeing no hands, I'm going to assume none of you have accessed that website.

It is my understanding a series of questions I submitted to Drake Haglan in regards to

flood impacts was only posted on that website. It was not issued directly to each one of you members up there that are voting tonight.

If you guys have not accessed this information, I could go through here and point out all the inconsistencies that were provided to me in regards to my questions. I'm not going to do that tonight. Multiple times, this says they were incorrect. Their responses I received were incorrect.

Knowledge is power. Maybe not as big as political power, but knowledge is power. If you don't have the right knowledge, how can you make the right decision? Thank you.

UNIDENTIFIED FEMALE SPEAKER: No other speakers?

MAYOR DeBRUM: No other speakers? Does anyone else wish to address the council? Okay. (Inaudible) yes. Good evening.

UNIDENTIFIED FEMALE SPEAKER: Good evening. I'm going to try not to get too emotional, but listening to all this and dealing with this for an extended period of time, I know I've mentioned to you all before that Marty and I live on Oleander, and what's funny, I was walking in and saw that Manteca is a family city. You guys might not know, but we have number 18 and 19 grandkids on the way coming in November and January,

and we gather at that property, and we love our property, and so do our grandkids.

In '97, 20 inches of water in that home. Marty and his family at the time were displaced. What I am hearing is that if this levee gets put where it's proposed to be, that can increase 3 feet. Upsetting.

You know, I have a lot of respect for all of you, and I'm praying for all of you. I'm praying for the developers and praying for my neighbors and my friends and the business owners south of that levee, and I'm mostly praying that you will consider everything that you've heard tonight and have heard over the last few years when you make your decisions. Thank you very much.

MAYOR DeBRUM: Yes, sir?

REESE VINCENT: Reese Vincent, and I live at 21561 Oleander. I live on the corner of Oleander and Fig, which has been mentioned. I've had wet feet a couple of times, but, Councilmembers, I want you to know that when I bought my property out there, I knew occasionally I'd get wet feet.

It's a wonderful place to live, and I'm very resistant to a board who I have absolutely no ballot box power with making decisions that you're going to ruin or change my quality of life.

I don't understand how we can sit through a two-hour meeting tonight and not one person has mentioned the cheapest of all things because of regulatory regulations of just simply dredging that 20 miles of San Joaquin River.

I can't understand how a meeting of this type can go forward and nobody want to buck the system. It's the cheapest and it's the easiest.

It offers the most protection, and yet, nobody wants to discuss it because the regulatory agencies won't let us do it. I'm asking you as a property owner on the wrong side of your levee to have at least the courtesy to take care of me. Don't just walk over me. Thank you.

MAYOR DeBRUM: Thank you. Anyone else? Yes, ma'am? Mrs. Harris and then Dr. Davis. Good evening.

LUCILLE HARRIS: I'm Lucille Harris, and my business is located on Almondwood Drive, but I am here -- just pull it down just a little bit, please. But I am here without any notes, and I'm not too comfortable, I have to tell you, but I do want to say that I know you're interested in this, Mayor, that the Manteca Historical Society, there is an extensive report by Alex Hildebrand.

It includes dredging, and every one of you

here should go to the Historical Society and read that report. Thank you.

MAYOR DeBRUM: Thank you. Dr. Davis?

DR. DAVIS: Good evening.

MAYOR DeBRUM: Good evening.

DR. DAVIS: I'm going to be very brief. I've been listening to everyone's opinions tonight, and I know you have to make a decision.

Whatever that decision is, it's going to settle here and hopefully go forward. I wish that you would add an addendum to whatever decision you make.

As Mr. Brinton has mentioned in the past, you already have entitlements in the 200-year floodplain that have been designed. I would ask that before you make a decision finally that you add the addendum that no construction take place, no permit actually be issued in any of those floodplain zones until the levee is actually constructed.

Once the levee is constructed, all those constructions -- all those developments are under the (Inaudible) flood.

As I understand, this is just a decision process tonight, 2016. 2017, '18, you're going to get the EIR's. Construction may not even take place until 2023 before the levee groundbreaking takes place.

In the meantime, any homes that are built there are now exposed to a 200-year flood that could happen between now and then, which puts all of us at risk.

If you're going to decide on anything, I would ask for an addendum. Don't permit construction there until the levee is actually built. That makes the most common sense.

Whatever happens between now and the levee construction, at least then you're protecting your rear if you wish to call it that, or the city's. I know there are entitlements already decided, but if you tell the developers that you have to express to the new (Inaudible) owners, new home owners that they're at a higher risk for flood and they're taking on that responsibility, again, a lot of homeowners will not buy a house in that place, particularly if the development company does not take full responsibility of the construction, and that should be thrown on them.

I understand the user fees. There is a user fee. Have them put up a bond saying if there's a 200-year floodplain before that levee is built, they take full responsibility. That is their responsibility. Thank you.

MAYOR DeBRUM: Thank you. Anyone else? Yes,

sir?

ANDREW WERTMAN: Andrew Wertman. I live at 4843 East Fig Avenue. It's a small ranch just east of Airport, but it is a ranch that me and my wife have sacrificed for, worked very hard for, and made good financial decisions so we can move out there in order to raise our kids out there, and for lack of a better word, I've been trying to think of a word while I've been sitting back there, but I'm going to use inappropriate, and I mean no disrespect to this lady here, but for her to downplay tonight's decisions, to downplay it, tonight is not going to happen, everything is going to happen down the road, I find that inappropriate.

This levee is going to go possibly directly behind my house, which is going to affect the whole reason and decision my wife and I made to move to the county to raise our kids in the country with agriculture and deep history and animals and everything that we came on a positive path in the future.

The last thing I want to ask is if it's possible to bring her back up and ask her that question again. If no house is built, is the levee required and get a straight answer. She, like Mr. Fonseca said, deflected and went into, well, it affects commercial

and commercial is going to pay for the levee. That's the way I understand it, is they're going to use commercial and residential development to fund this levee, and if it's possible, will she answer the question directly, if nothing is built, is this levee required? Thank you.

ALICIA GUERRA. I thought you might ask me to come back up here.

MAYOR DeBRUM: Yeah.

ALICIA GUERRA: So if nothing is built and there is no more development, then 200-year -- a 200-year levee improvement is not required because there's no need to continue to implement those findings.

But we have a plan, the local communities have a plan to provide for 200-year flood protection. That plan depends on a self-funded strategy where all of this development, development impact fees, assessments, special financing districts are going to be used to fund that protection, that 200-year flood protection.

It applies to commercial. It applies to residential. RD17 has some challenges with its Board of Trustees because they all own property there, and RD17 cannot undertake improvements that benefit some part of the property within the reclamation district to

the detriment of other properties within the reclamation district, so when it makes a decision to go forward to continue to maintain a 100-year flood protection as it's done with its levee seepage repair project, it benefits everybody.

Similarly, when it makes the decision to go forward with phase 4, which is described in the adequate progress report and the finance plan, it's benefitting everybody.

The only way to benefit everybody is for this new development that's within the area to fund the protection for the benefit of everybody, and that's what this plan contemplates.

It is a viable plan. The law requires that you map out a plan for how you will have 200-year flood protection in 2025. It's not required prior to 2000 -- it wasn't required prior to 2012 as someone had indicated previously. It's not required today, and all of that development that is proceeding is with the plan to start funding today to make that 200-year flood protection a reality, recognizing the constraints of the process, the permitting requirements, dealing with the state and federal agencies, all of that is an effort to come up with state and federal funding to help fund this effort, and if that doesn't happen,

there is a program reflected in the adequate progress report that shows in the finance plan how flood protection to 200-year flood protection for everybody will be provided.

Again, if there's no more development for today, then there isn't 200-year flood protection for anybody in this area. This plan is to have it for everybody in RD17, and that's the proposal.

UNIDENTIFIED MALE SPEAKER: And that's whether it's residential or commercial?

ALICIA GUERRA: Whether it's residential or commercial, and the reason is that findings were required depending on the level of entitlements you're seeking.

If you're commercial and you need a discretionary approval, you have to make a 200-year flood protection requirement just like if you're a residential project with a tentative subdivision map or a building permit, and everybody -- this finance plan is based on treating everybody acre-for-acre because everybody benefits from the flood protection, and that's how the plan is formulated.

MAYOR DeBRUM: Okay. Thank you. Anyone else? Yes, ma'am? Good evening.

SUE QUARESMA: Good evening. Sue Quaresma, and I

live out -- further out. We live out on Harem (phonetic) and Union. A couple things I want to say tonight. I want to know how this is wise use of -- the DWR says promote wise use of floodplain.

When you look at the maps that were presented by Drake Haglan tonight, you can see the area they want to protect is deep red. That's 10 feet. That's deep floodplain. When you look below where the levee is going, that's where we're all at. We're at 10 feet, too.

She said tonight, this is going to benefit everybody. I don't think so. It benefits RD17, but none of the districts below RD17, none of the farms, and none of the families that have been there, raised their children, want to make a life, nobody down there.

I think it -- and it's sad that we have no voice, other than to come up here and say what we feel. We can't vote for you guys, but we're being the ones that are being made to suffer because there will be flooding, and we're okay with what we had before, but when you guys are proposing this to push more on us -- and I take offense to her saying that it benefits everybody because it doesn't. Thank you.

MAYOR DeBRUM: Thank you. Anyone else? Anyone else? I want to bring it back up front, Mr. Morowit.

COUNCILMAN MOROWIT: This decision doesn't come lightly or even tonight's meeting. I was preparing for this prior. I see no perfect solution regardless for anybody, and you're correct, there is not -- for everyone, there is no such thing as everyone in this room or in this city for that matter that results from what we do or don't do.

I do have concerns about -- because people seem to be mentioning tonight that they do expect more water to come that way, and if that's the case, then it will affect people within the city, and it also may affect negatively the people that live on the other side, I agree.

There is no perfect solution, but it seems to me everybody seems to be concerned about a bigger flood or maybe a flood back in the 50's that occurred way before I ever came out here, as well, so I respect that. I understand that.

Regardless of what we do tonight -- and I'm going to ask Mr. Brinton, I'll pick an attorney that might be a little more neutral to the folks, doesn't work for anyone, other than the city. What we decide today will require an environmental impact report?

MR. BRINTON: Absolutely.

COUNCILMAN MOROWIT: And the decision with regard

to the alignment, although a preferred alignment does not mean that it will turn out that way?

MR. BRINTON: Correct.

COUNCILMAN MOROWIT: It could be extended farther. I understand some people -- some folks have come up tonight, said that maybe it should go farther. Maybe it should stop where it is now, but regardless, that is not a decision we have tonight; is that right?

MR. BRINTON: (Inaudible).

COUNCILMAN MOROWIT: As far as what we have on the board for homes, I agree, so right now, they're in the 100-year floodplain type of a levee, but I do think that needs to be built up, too, for the homes and businesses and things that are inside that levee, but I really don't know enough to know without an environmental impact report, and I have seen many when I was on the Planning Commission, and they're extremely detailed, as most people know, and they're usually very much controversial, and this will be very controversial.

I may or may not be here then. Sometimes I wonder why I'm here now. It's difficult to make these decisions quite frankly, and I don't take them lightly, but I do know that we have to start someplace because I do feel that we are a consensus, and there will be

water and it could be higher than what it has been, and so I do feel that we have to start someplace, so I have a lot of faith in the environmental impact reports.

They're very detailed, and if we go to CEQA and go into the other one for the federal, I'm in hopes that we will get a better answer.

As far as land that's going to be grabbed or taken, I can't even answer that. I don't know what the dollar amount is. I don't know what they've even told you. I don't know. But I do know that we have to start someplace to at least identify that.

Maybe at the end of the day, this thing drops down or goes up. I have no idea, but I do believe we have to do something because I do believe we'll have another flood and that will be of greater magnitude than we had that possibly what was in the past history.

History tends to repeat itself, but I don't know, but I do know enough to know that I have some faith or a lot of faith in environmental impact reports, and I realize that they are extremely tedious and long and drawn out and expensive, but in this case, I think it is the only way to get an answer that will be better than just a couple of folks sitting up here, five people making a decision, but I do think they will

do a better job of dissecting the problems, and then like I say, it will come before a body like ours again. With or without us, it will come before us, but at least we'll have more information, so I do believe we have to start someplace, but it doesn't come lightly, and I'm really hoping that clarity will come through further investigation and reports, CEQA, if the Feds get involved, and I do agree with some of the folks, yes, we should dredge the river, but it does not seem to be an option that anybody is proposing nor do they want to do.

I agree. It seems much simpler. We've talked about it before, but I just don't feel -- at this time, maybe more people can put more pressure on those entities and the Corps, the Feds to do something about the dredging because it would make a lot more sense, but at this time, I don't think that's something we could consider, although I would love to have that be considered along with this.

Maybe it would be a combination or take up less land, but at this time, we have to start someplace, and I have some faith in the system. I shouldn't say some. I have a lot of faith in that part of the system because I've seen it and I realize the magnitude of the information that has to come forth and

the workshops, and then it will come back again. It won't be for sometime, but hopefully at a better time for us.

UNIDENTIFIED MALE SPEAKER: (Inaudible).

COUNCILMAN SILVERMAN: I can only (Inaudible) some of those comments. I've read everything, all your letters, the documents, Mr. Harris, Mr. Perkins. I've read these things.

I've been out there. I've walked it. You are being considered. Your thoughts are heard, okay? It is a very tough decision. It's the toughest one I've had to make yet.

I'd like to bring up dredging real quickly. I know when we've gone back to Washington, we've met with the Army Corps of Engineers, we've met with Congressman Ganz' office. We're continuing that. I was at French Camp. They had a meeting out there. We met the new colonel for the Army Corps of Engineers for our area.

Dredging was mentioned a little bit. That's a toughy. The dredging is a very, very tough thing, and unfortunately, it doesn't really have anything to do with the floodplain. They could start dredging tomorrow. We still are under SB 5. SB 5 doesn't go away just because there's dredging. We

still have to deal with it, so it's a toughy.

When I vote up here, I'm voting. I hear you, you're concerned. You're in our sphere of influence and things like that. I'm also voting for the 75,000 other people that live in the City of Manteca. I'm representing them overall, everyone.

I'm having to make decisions that are having to be 20, 30, 40 years out. I pray every night that I'm making the right ones, they'll turn out right. I suspect, unfortunately, I'm getting a little bit of a pessimist that some of them may not, but I can live with that.

I'm doing the best I can making what I think is the right decision based on all of the input, all of the things to consider, so just want to make sure you know you're heard.

MAYOR DeBRUM: Thank you. Debby?

COUNCILWOMAN MOORHEAD: I want to address the question, I believe, by Michael Fonseca about his questions. The City Clerk does send all that over to us. We got it in an e-mail. Just so you know, that does come directly to us. It just doesn't go to a website. It comes to us, and we got it, so just so you know that, we did get that from our City Clerk.

Another thing, I have had the -- it had to

be from me, not just to look at this on paper after I saw this presentation already. Each councilmember has already seen this presentation and had a chance to ask questions, and so I needed to go out to the levee, walk on the levee, go look at all the land, drive everywhere I could go to make sure I knew what I was looking at on paper. I got to see an actual what it is because seeing it on paper and going out there, it's two different things, so we have been taking this very serious.

I know it's very serious for all of you. These are your homes. This is where you live. This is where you work, and that's important. It's important to us that it's important to you. This is your life.

We have to sit here and make decisions all the time that we are like on the fence about, and it's really difficult, and so we have to make sure we get all the right information, and sometimes it's confusing, and so for us, this is our starting place. I know this is where we're starting at.

We're not making any decisions on how it's going to be exactly, but your input is the most important to us. We have to make those decisions based on everything, not just what a consultant is telling us, so the fact that you guys come here and tell us

what you feel and what's going on, that's majorly important for us, and I thank you for doing that.

MAYOR DeBRUM: Thank you. I just -- before I make my comments, I just want to read this. It is important to note that the Council's potential action on selecting a preferred alignment is not the final selection of alignment. The final selection of alignment will occur as part of the CEQA process.

An additional public outreach will be required and a no-build alternative will be studied in addition to the preferred alternative under possible variation under the preferred alternative, so as we go through the entire processes, my colleagues have all indicated this is a tough decision, things that we certainly need to look at to have and understand.

You know, we can -- I've often talked about the dredging. I certainly think that that's something that's very important that ultimately we need to look at, but unfortunately, it's not the solution to all.

The dredging is a portion of what we need to be looking at, but it's not going to fix the entire problem. We need to, in my opinion, get that all cleaned out to make sure that everything is -- the water will flow as it should be.

You know, I've heard Mr. Quaresma several

times talk about the water flows and the areas and the high points, the low points where the water flows and so forth, all very important. The fact that Mr. Hildebrand and his comments that he brought forward in -- previously about the dredging aspect were important, and those are things, I think, that are important that we have to have on the forefront.

When we look at the big broad picture and it was said already, this is a starting point, we need to go where we have never been before to have the opportunity to look at the designs, look at the engineering, to look at the land, potential land acquisitions going forward through the EIR process.

This whole thing is not development-driven, believe me. The State of California has set the guidelines for our community and every community that's involved in the direction that we're going. You know, we're involved with Stockton, the county, RD17, the City of Lathrop, ourselves, everyone coming together to try to make the appropriate decisions that it's going to put this thing going forward, and, you know, as we continue to look and the question was asked and, you know, I did ask if we did not build another house, particularly, what would we be looking at, but I'm also looking up at the jail, I'm also looking at the County

Hospital, I'm also looking at the new VA facility. I'm looking at Highway 5. You want to close Highway 5, you want to see what you're going to do to it and the impact that's going to be placed on our -- the entire region with the closure of 5, that is something else that we need to look at, so, you know, it's all about doing the right thing at the right time, and sometimes making the right decision isn't always easy, but it's always the right thing to do, and so, you know, we're having to go forward, we're having to make those tough decisions in order to get us where we want to be, and I think, you know, at the end of the day, the entire process, we're so far from it, and I think it was eloquently put earlier, you know, we are looking at '17, '18 when the EIR process begins. We're looking at '18, '19, '20, '21 before we even see anything, any development.

We've got to find where the funding source is going to come from, whether it's going to be federal dollars, state dollars, accumulation of all what the cities are putting in, what the development communities are putting in, so, you know, these are all things that we need to look at, and believe me, I certainly understand where everyone is sitting on that -- in the area in which you have to think and what you have to

say, so with that, what does the council wish to do? (Inaudible) motion.

COUNCILMAN SILVERMAN: I'll do it. I'll move to receive the presentation and approve alternate 2A.

MAYOR DeBRUM: And do I have a second place?

COUNCILWOMAN MOORHEAD: Second.

MAYOR DeBRUM: Properly moved and seconded, and all in favor, say eye.

(Councilmembers responded aye.)

MAYOR DeBRUM: (Inaudible) same sign. Motion carried four to zero. Okay. Public comment? No public comment? Yeah. We'll just wait up 2 seconds. Then we'll....

COUNCILMAN SILVERMAN: Tough vote.

MAYOR DeBRUM: It was.

COUNCILMAN SILVERMAN: Toughest one I've voted.

MAYOR DeBRUM: All right. No public comment? We'll now move on to City Manager's comments.

MS. REYES: Mayor and Councilmembers, I'd like to note that Police Chief Nick Obligacion officially retired yesterday, August the 15th.

The chief's service to the City of Manteca is very much appreciated. As per the memo from the former City Manager dated June 21st, 2016 to the council, former Chief Obligacion has been retained by

Appendix B

Air Quality, Greenhouse Gas, and Energy Modeling

Appendix B
CalEEMod (v.2016) Assumptions

- Air District: San Joaquin Valley
- Climate Zone: 2
- Land Use Setting: Urban
- Start of Construction: Thursday, June 1, 2017
- Operational Year: 2019
- Utility Company: PG&E
- Land Uses:

Land Use Type and Subtype	Unit Amount and Metric	Lot Acreage	Square Footage	Population
Residential – Single Family Housing	975 DU	226.93	--	3,052
Residential – Apartments Low Rise	290 DU	11.59	--	908
Retail – Regional Shopping Center	237.838 KSF	13.00	237,838 SF	--

- Population: According to the most recent U.S. Census (2014) and Department of Finance (2016) estimates, the average number of persons residing in a dwelling unit in the City of Manteca is 3.13.
- Construction Tab – Phasing:
    - Architectural Coating: 920 days
        - 4/22/18 – 10/29/2021
        - Assumed construction of 2 units per week per active subdivision with 4 active subdivisions (8 units per week)
        - Assumed construction 5 days per week
        - Assumed an additional 6 months to finish (at 5 days per week)
    - Building Construction: 920 days
        - 12/22/17 – 7/1/2021
        - Assumed construction of 2 units per week per active subdivision with 4 active subdivisions (8 units per week)
        - Assumed construction 5 days per week
        - Assumed an additional 6 months to finish (at 5 days per week)
    - Demolition: 1 day
        - 6/1/17 – 6/1/17
        - Assumed 1 structure demolished per day with 1 structure on-site
    - Grading: 100 days
        - 7/6/17 – 11/22/17
        - Assumed non-phased grading, all underground utility construction, worst case scenario
    - Paving: 86 days
        - 11/22/17 – 3/21/18
        - Assumed 3 acres paved per day
    - Site Prep: 26 days
        - 6/1/17 – 7/6/17
        - Assumed 10 acres prepped per day
- Construction Tab – Off-Road Equipment:
    - Architectural Coating: 4 compressors (6 hours per day)
        - 1 compressor per active subdivision
    - Building Construction: 1 crane (3 hours per day), 4 forklifts, 4 generator sets, 4 backhoes (4 hours per day), 1 welder (4 hours per day)
        - 1 machine per active subdivision, minimal welding
    - Demolition: 1 concrete/industrial saws, 1 excavators, 1 rubber tired dozers
        - One piece of equipment for every structure demolished (1)

    - Grading: 4 excavators, 2 graders, 2 dozers, 2 scrapers, 2 backhoes
        - Engineer's estimate
    - Paving: 2 pavers, 2 paving equipment, 2 rollers
        - 1/2 machine per active subdivision
    - Site Prep: 3 dozers, 4 tractors
- Construction Tab – Dust From Material Movement:
    - Grading Total Acres Disturbed: 258.29
    - Site Prep Total Acres Disturbed: 258.29
- Construction Tab – Demolition:
    - 800 SF structure
- Operational Tab – Mobile:
    - Regional Shopping Center: 40.91 daily trips, per Fehr & Peers Traffic Study
        - Assumes internalization of 4.2%, per Fehr & Peers Traffic Study
        - Weekday only
    - Apartments Low Rise: 6.37 daily trips, per Fehr & Peers Traffic Study
        - Assumes internalization of 4.2%, per Fehr & Peers Traffic Study
        - Weekday only
    - Single Family Housing: 9.12 daily trips, per Fehr & Peers Traffic Study
        - Assumes internalization of 4.2%, per Fehr & Peers Traffic Study
        - Weekday only
- Vegetation Tab: 237.9 acres of initial cropland, 0 acres final
- Mitigation Tab:
    - Construction:
        - Water exposed areas 3 times per day,
        - Unpaved road mitigation 5 MPH
    - Traffic:
        - Project Setting: Low Density Suburban,
        - 2.9 miles to downtown,
        - 0.9 miles to transit station at Brook View Land / Daniels Street,
        - Increase Density (4.9 dwelling units per acre),
        - 38 intersections per 1/4 mile (based on Cerri TM) = 152 intersections per mile
        - Traffic calming measures 25% streets and intersections (landscape islands, signal timers, raised intersections, street parking),
        - Improve pedestrian network on and off site,
        - Increase density to 4.9 units per acre
    - Area:
        - Only natural gas hearths,
        - Low VOC paint (residential interior and exterior and non-res interior and exterior),
        - Low VOC cleaning supplies
    - Energy:
        - Exceed Title 24 by 15%,
        - Install efficient lighting 16%,
        - All appliance subtypes should be single family housing and apartments low rise
    - Water:
        - Install all low-flow
        - Water efficient irrigation 6.1% reduction

Oakwood Landing

San Joaquin Valley Unified APCD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Low Rise	290.00	Dwelling Unit	11.59	290,000.00	908
Single Family Housing	975.00	Dwelling Unit	226.93	1,755,000.00	3052
Regional Shopping Center	237.84	1000sqft	13.00	237,838.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	45
Climate Zone	2			**Operational Year**	2019
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See assumptions in Appendix B

Construction Phase - See assumptions in Appendix B

Off-road Equipment - See assumptions in Appendix B

Off-road Equipment - See assumptions in Appendix B4

Off-road Equipment - See assumptions in Appendix B

Off-road Equipment - See assumptions in Appendix B

Off-road Equipment -

Off-road Equipment -

Grading - See assumptions in Appendix B

Demolition - See assumptions in Appendix B

Vehicle Trips - See assumptions in Appendix B

Land Use Change - See assumptions in Appendix B

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Area Mitigation -

Energy Mitigation -

Water Mitigation -

Table Name	Column Name	Default Value	New Value
tblAreaMitigation	UseLowVOCPaintParkingCheck	False	True
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	5
tblConstructionPhase	NumDays	330.00	920.00
tblConstructionPhase	NumDays	4,650.00	920.00
tblConstructionPhase	NumDays	300.00	1.00
tblConstructionPhase	NumDays	465.00	100.00

Oakwood Landing - San Joaquin Valley Unified APCD Air District, Annual

tblConstructionPhase	NumDays	330.00	86.00
tblConstructionPhase	NumDays	180.00	26.00
tblConstructionPhase	PhaseEndDate	5/31/2017	10/29/2021
tblConstructionPhase	PhaseEndDate	5/31/2017	7/1/2021
tblConstructionPhase	PhaseEndDate	5/31/2017	6/1/2017
tblConstructionPhase	PhaseEndDate	5/31/2017	11/22/2017
tblConstructionPhase	PhaseEndDate	5/31/2017	3/21/2018
tblConstructionPhase	PhaseEndDate	5/31/2017	7/6/2017
tblConstructionPhase	PhaseStartDate	6/1/2017	4/22/2018
tblConstructionPhase	PhaseStartDate	6/1/2017	12/22/2017
tblConstructionPhase	PhaseStartDate	6/1/2017	7/6/2017
tblConstructionPhase	PhaseStartDate	6/1/2017	11/22/2017
tblGrading	AcresOfGrading	300.00	258.29
tblGrading	AcresOfGrading	0.00	258.29
tblLandUse	LotAcreage	18.13	11.59
tblLandUse	LotAcreage	316.56	226.93
tblLandUse	LotAcreage	5.46	13.00
tblLandUse	Population	920.00	908.00
tblLandUse	Population	3,093.00	3,052.00
tblOffRoadEquipment	OffRoadEquipmentType		Air Compressors
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	4.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	UsageHours	7.00	3.00
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblProjectCharacteristics	OperationalYear	2018	2019
tblVehicleTrips	WD_TR	6.59	6.37
tblVehicleTrips	WD_TR	42.70	40.91
tblVehicleTrips	WD_TR	9.52	9.12
tblWoodstoves	NumberCatalytic	11.59	0.00
tblWoodstoves	NumberCatalytic	226.93	0.00
tblWoodstoves	NumberNoncatalytic	11.59	0.00
tblWoodstoves	NumberNoncatalytic	226.93	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.5426	6.0119	3.3884	5.8200e-003	1.1457	0.2804	1.4261	0.4990	0.2583	0.7573	0.0000	538.5480	538.5480	0.1522	0.0000	542.3529
2018	5.2752	8.3471	8.2653	0.0210	0.9094	0.3469	1.2564	0.2452	0.3328	0.5780	0.0000	1,911.6645	1,911.6645	0.1773	0.0000	1,916.0959
2019	6.9489	7.3205	7.5143	0.0206	0.9466	0.2809	1.2275	0.2551	0.2706	0.5256	0.0000	1,866.5284	1,866.5284	0.1525	0.0000	1,870.3403
2020	6.8657	6.7040	7.0579	0.0203	0.9502	0.2405	1.1907	0.2561	0.2317	0.4877	0.0000	1,841.7800	1,841.7800	0.1442	0.0000	1,845.3844
2021	5.3400	3.0959	3.5397	0.0105	0.5151	0.1038	0.6189	0.1387	0.1001	0.2388	0.0000	947.4822	947.4822	0.0701	0.0000	949.2356
Maximum	**6.9489**	**8.3471**	**8.2653**	**0.0210**	**1.1457**	**0.3469**	**1.4261**	**0.4990**	**0.3328**	**0.7573**	**0.0000**	**1,911.6645**	**1,911.6645**	**0.1773**	**0.0000**	**1,916.0959**

2.1 Overall Construction

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.5426	6.0119	3.3883	5.8200e-003	0.4678	0.2804	0.7482	0.2002	0.2583	0.4585	0.0000	538.5474	538.5474	0.1522	0.0000	542.3523
2018	5.2752	8.3471	8.2653	0.0210	0.9094	0.3469	1.2564	0.2452	0.3328	0.5780	0.0000	1,911.6638	1,911.6638	0.1773	0.0000	1,916.0952
2019	6.9489	7.3205	7.5143	0.0206	0.9466	0.2809	1.2275	0.2551	0.2706	0.5256	0.0000	1,866.5278	1,866.5278	0.1525	0.0000	1,870.3397
2020	6.8657	6.7040	7.0578	0.0203	0.9502	0.2405	1.1907	0.2561	0.2317	0.4877	0.0000	1,841.7794	1,841.7794	0.1442	0.0000	1,845.3837
2021	5.3400	3.0959	3.5397	0.0105	0.5151	0.1038	0.6189	0.1387	0.1001	0.2388	0.0000	947.4819	947.4819	0.0701	0.0000	949.2353
Maximum	**6.9489**	**8.3471**	**8.2653**	**0.0210**	**0.9502**	**0.3469**	**1.2564**	**0.2561**	**0.3328**	**0.5780**	**0.0000**	**1,911.6638**	**1,911.6638**	**0.1773**	**0.0000**	**1,916.0952**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**15.18**	**0.00**	**11.85**	**21.43**	**0.00**	**11.55**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	6-1-2017	8-31-2017	2.8879	2.8879
2	9-1-2017	11-30-2017	3.1906	3.1906
3	12-1-2017	2-28-2018	2.3288	2.3288
4	3-1-2018	5-31-2018	3.0211	3.0211
5	6-1-2018	8-31-2018	3.7756	3.7756
6	9-1-2018	11-30-2018	3.7495	3.7495

7	**12-1-2018**	**2-28-2019**	3.5938	3.5938
8	**3-1-2019**	**5-31-2019**	3.5957	3.5957
9	**6-1-2019**	**8-31-2019**	3.5893	3.5893
10	**9-1-2019**	**11-30-2019**	3.5629	3.5629
11	**12-1-2019**	**2-29-2020**	3.4442	3.4442
12	**3-1-2020**	**5-31-2020**	3.4069	3.4069
13	**6-1-2020**	**8-31-2020**	3.4019	3.4019
14	**9-1-2020**	**11-30-2020**	3.3748	3.3748
15	**12-1-2020**	**2-28-2021**	3.2257	3.2257
16	**3-1-2021**	**5-31-2021**	3.2273	3.2273
17	**6-1-2021**	**8-31-2021**	2.1303	2.1303
18	**9-1-2021**	**9-30-2021**	0.5135	0.5135
		Highest	3.7756	3.7756

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	11.3449	0.5825	9.6429	3.5200e-003		0.0900	0.0900		0.0900	0.0900	0.0000	563.3545	563.3545	0.0256	0.0101	566.9879
Energy	0.2087	1.7915	0.8191	0.0114		0.1442	0.1442		0.1442	0.1442	0.0000	5,882.0240	5,882.0240	0.2122	0.0736	5,909.2519
Mobile	8.5440	85.5607	83.2756	0.3286	18.2990	0.4365	18.7355	4.9241	0.4140	5.3381	0.0000	30,476.6123	30,476.6123	2.3808	0.0000	30,536.1327
Waste						0.0000	0.0000		0.0000	0.0000	310.8685	0.0000	310.8685	18.3718	0.0000	770.1635
Water						0.0000	0.0000		0.0000	0.0000	31.7372	221.3705	253.1077	3.2697	0.0790	358.4047
Total	**20.0976**	**87.9347**	**93.7375**	**0.3435**	**18.2990**	**0.6707**	**18.9697**	**4.9241**	**0.6482**	**5.5723**	**342.6057**	**37,143.3613**	**37,485.9670**	**24.2601**	**0.1627**	**38,140.9406**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	10.6783	0.5825	9.6429	3.5200e-003		0.0900	0.0900		0.0900	0.0900	0.0000	563.3545	563.3545	0.0256	0.0101	566.9879
Energy	0.1802	1.5469	0.7068	9.8300e-003		0.1245	0.1245		0.1245	0.1245	0.0000	5,309.3006	5,309.3006	0.1936	0.0657	5,333.7139
Mobile	8.2354	81.7478	77.4821	0.3021	16.5148	0.3991	16.9140	4.4440	0.3786	4.8226	0.0000	28,021.8889	28,021.8889	2.3109	0.0000	28,079.6615
Waste						0.0000	0.0000		0.0000	0.0000	310.8685	0.0000	310.8685	18.3718	0.0000	770.1635
Water						0.0000	0.0000		0.0000	0.0000	25.3898	185.9785	211.3682	2.6162	0.0633	295.6407
Total	**19.0939**	**83.8772**	**87.8317**	**0.3154**	**16.5148**	**0.6136**	**17.1285**	**4.4440**	**0.5931**	**5.0370**	**336.2582**	**34,080.5226**	**34,416.7808**	**23.5181**	**0.1391**	**35,046.1673**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**4.99**	**4.61**	**6.30**	**8.18**	**9.75**	**8.51**	**9.71**	**9.75**	**8.51**	**9.61**	**1.85**	**8.25**	**8.19**	**3.06**	**14.51**	**8.11**

2.3 Vegetation

Vegetation

	CO2e
Category	MT
Vegetation Land Change	-1,474.9800
Total	**-1,474.9800**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Architectural Coating	Architectural Coating	4/22/2018	10/29/2021	5	920	
2	Building Construction	Building Construction	12/22/2017	7/1/2021	5	920	
3	Demolition	Demolition	6/1/2017	6/1/2017	5	1	
4	Grading	Grading	7/6/2017	11/22/2017	5	100	
5	Paving	Paving	11/22/2017	3/21/2018	5	86	
6	Site Preparation	Site Preparation	6/1/2017	7/6/2017	5	26	

Acres of Grading (Site Preparation Phase): 258.29

Acres of Grading (Grading Phase): 258.29

Acres of Paving: 0

Residential Indoor: 4,141,125; Residential Outdoor: 1,380,375; Non-Residential Indoor: 356,757; Non-Residential Outdoor: 118,919; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	1	8.00	158	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	4	8.00	158	0.38
Building Construction	Cranes	1	3.00	231	0.29
Building Construction	Forklifts	4	8.00	89	0.20
Building Construction	Generator Sets	4	8.00	84	0.74
Paving	Pavers	2	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Rubber Tired Dozers	2	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	4	4.00	97	0.37
Grading	Graders	2	8.00	187	0.41
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Paving Equipment	2	8.00	132	0.36
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Building Construction	Welders	1	4.00	46	0.45
	Air Compressors	4	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	127.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	14	636.00	174.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	3	8.00	0.00	4.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	12	30.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Architectural Coating - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	4.1016					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0270	0.1815	0.1678	2.7000e-004		0.0136	0.0136		0.0136	0.0136	0.0000	23.1070	23.1070	2.2000e-003	0.0000	23.1619
Total	**4.1286**	**0.1815**	**0.1678**	**2.7000e-004**		**0.0136**	**0.0136**		**0.0136**	**0.0136**	**0.0000**	**23.1070**	**23.1070**	**2.2000e-003**	**0.0000**	**23.1619**

3.2 Architectural Coating - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0595	0.0430	0.4288	9.7000e-004	0.0919	7.0000e-004	0.0926	0.0244	6.4000e-004	0.0251	0.0000	87.7376	87.7376	3.1000e-003	0.0000	87.8152
Total	**0.0595**	**0.0430**	**0.4288**	**9.7000e-004**	**0.0919**	**7.0000e-004**	**0.0926**	**0.0244**	**6.4000e-004**	**0.0251**	**0.0000**	**87.7376**	**87.7376**	**3.1000e-003**	**0.0000**	**87.8152**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	4.1016					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0270	0.1815	0.1678	2.7000e-004		0.0136	0.0136		0.0136	0.0136	0.0000	23.1070	23.1070	2.2000e-003	0.0000	23.1619
Total	**4.1286**	**0.1815**	**0.1678**	**2.7000e-004**		**0.0136**	**0.0136**		**0.0136**	**0.0136**	**0.0000**	**23.1070**	**23.1070**	**2.2000e-003**	**0.0000**	**23.1619**

3.2 Architectural Coating - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0595	0.0430	0.4288	9.7000e-004	0.0919	7.0000e-004	0.0926	0.0244	6.4000e-004	0.0251	0.0000	87.7376	87.7376	3.1000e-003	0.0000	87.8152
Total	**0.0595**	**0.0430**	**0.4288**	**9.7000e-004**	**0.0919**	**7.0000e-004**	**0.0926**	**0.0244**	**6.4000e-004**	**0.0251**	**0.0000**	**87.7376**	**87.7376**	**3.1000e-003**	**0.0000**	**87.8152**

3.2 Architectural Coating - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.9144					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0348	0.2395	0.2403	3.9000e-004		0.0168	0.0168		0.0168	0.0168	0.0000	33.3200	33.3200	2.8100e-003	0.0000	33.3903
Total	**5.9492**	**0.2395**	**0.2403**	**3.9000e-004**		**0.0168**	**0.0168**		**0.0168**	**0.0168**	**0.0000**	**33.3200**	**33.3200**	**2.8100e-003**	**0.0000**	**33.3903**

3.2 Architectural Coating - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0771	0.0541	0.5439	1.3600e-003	0.1325	9.8000e-004	0.1335	0.0352	9.0000e-004	0.0361	0.0000	122.7864	122.7864	3.9300e-003	0.0000	122.8845
Total	**0.0771**	**0.0541**	**0.5439**	**1.3600e-003**	**0.1325**	**9.8000e-004**	**0.1335**	**0.0352**	**9.0000e-004**	**0.0361**	**0.0000**	**122.7864**	**122.7864**	**3.9300e-003**	**0.0000**	**122.8845**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.9144					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0348	0.2395	0.2403	3.9000e-004		0.0168	0.0168		0.0168	0.0168	0.0000	33.3199	33.3199	2.8100e-003	0.0000	33.3903
Total	**5.9492**	**0.2395**	**0.2403**	**3.9000e-004**		**0.0168**	**0.0168**		**0.0168**	**0.0168**	**0.0000**	**33.3199**	**33.3199**	**2.8100e-003**	**0.0000**	**33.3903**

3.2 Architectural Coating - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0771	0.0541	0.5439	1.3600e-003	0.1325	9.8000e-004	0.1335	0.0352	9.0000e-004	0.0361	0.0000	122.7864	122.7864	3.9300e-003	0.0000	122.8845
Total	**0.0771**	**0.0541**	**0.5439**	**1.3600e-003**	**0.1325**	**9.8000e-004**	**0.1335**	**0.0352**	**9.0000e-004**	**0.0361**	**0.0000**	**122.7864**	**122.7864**	**3.9300e-003**	**0.0000**	**122.8845**

3.2 Architectural Coating - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.9371					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0317	0.2206	0.2399	3.9000e-004		0.0145	0.0145		0.0145	0.0145	0.0000	33.4476	33.4476	2.5900e-003	0.0000	33.5124
Total	**5.9688**	**0.2206**	**0.2399**	**3.9000e-004**		**0.0145**	**0.0145**		**0.0145**	**0.0145**	**0.0000**	**33.4476**	**33.4476**	**2.5900e-003**	**0.0000**	**33.5124**

3.2 Architectural Coating - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0703	0.0477	0.4851	1.3200e-003	0.1330	9.5000e-004	0.1340	0.0354	8.7000e-004	0.0362	0.0000	119.4422	119.4422	3.4200e-003	0.0000	119.5277
Total	**0.0703**	**0.0477**	**0.4851**	**1.3200e-003**	**0.1330**	**9.5000e-004**	**0.1340**	**0.0354**	**8.7000e-004**	**0.0362**	**0.0000**	**119.4422**	**119.4422**	**3.4200e-003**	**0.0000**	**119.5277**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.9371					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0317	0.2206	0.2399	3.9000e-004		0.0145	0.0145		0.0145	0.0145	0.0000	33.4476	33.4476	2.5900e-003	0.0000	33.5123
Total	**5.9688**	**0.2206**	**0.2399**	**3.9000e-004**		**0.0145**	**0.0145**		**0.0145**	**0.0145**	**0.0000**	**33.4476**	**33.4476**	**2.5900e-003**	**0.0000**	**33.5123**

3.2 Architectural Coating - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0703	0.0477	0.4851	1.3200e-003	0.1330	9.5000e-004	0.1340	0.0354	8.7000e-004	0.0362	0.0000	119.4422	119.4422	3.4200e-003	0.0000	119.5277
Total	**0.0703**	**0.0477**	**0.4851**	**1.3200e-003**	**0.1330**	**9.5000e-004**	**0.1340**	**0.0354**	**8.7000e-004**	**0.0362**	**0.0000**	**119.4422**	**119.4422**	**3.4200e-003**	**0.0000**	**119.5277**

3.2 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	4.8947					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0236	0.1649	0.1963	3.2000e-004		0.0102	0.0102		0.0102	0.0102	0.0000	27.5751	27.5751	1.8900e-003	0.0000	27.6225
Total	**4.9183**	**0.1649**	**0.1963**	**3.2000e-004**		**0.0102**	**0.0102**		**0.0102**	**0.0102**	**0.0000**	**27.5751**	**27.5751**	**1.8900e-003**	**0.0000**	**27.6225**

3.2 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0534	0.0350	0.3628	1.0500e-003	0.1097	7.5000e-004	0.1104	0.0292	6.9000e-004	0.0298	0.0000	95.0483	95.0483	2.5100e-003	0.0000	95.1111
Total	**0.0534**	**0.0350**	**0.3628**	**1.0500e-003**	**0.1097**	**7.5000e-004**	**0.1104**	**0.0292**	**6.9000e-004**	**0.0298**	**0.0000**	**95.0483**	**95.0483**	**2.5100e-003**	**0.0000**	**95.1111**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	4.8947					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0236	0.1649	0.1963	3.2000e-004		0.0102	0.0102		0.0102	0.0102	0.0000	27.5751	27.5751	1.8900e-003	0.0000	27.6224
Total	**4.9183**	**0.1649**	**0.1963**	**3.2000e-004**		**0.0102**	**0.0102**		**0.0102**	**0.0102**	**0.0000**	**27.5751**	**27.5751**	**1.8900e-003**	**0.0000**	**27.6224**

3.2 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0534	0.0350	0.3628	1.0500e-003	0.1097	7.5000e-004	0.1104	0.0292	6.9000e-004	0.0298	0.0000	95.0483	95.0483	2.5100e-003	0.0000	95.1111
Total	**0.0534**	**0.0350**	**0.3628**	**1.0500e-003**	**0.1097**	**7.5000e-004**	**0.1104**	**0.0292**	**6.9000e-004**	**0.0298**	**0.0000**	**95.0483**	**95.0483**	**2.5100e-003**	**0.0000**	**95.1111**

3.3 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0128	0.1052	0.0807	1.3000e-004		7.3700e-003	7.3700e-003		7.0900e-003	7.0900e-003	0.0000	11.1004	11.1004	1.8500e-003	0.0000	11.1465
Total	**0.0128**	**0.1052**	**0.0807**	**1.3000e-004**		**7.3700e-003**	**7.3700e-003**		**7.0900e-003**	**7.0900e-003**	**0.0000**	**11.1004**	**11.1004**	**1.8500e-003**	**0.0000**	**11.1465**

3.3 Building Construction - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.3100e-003	0.0783	0.0181	1.5000e-004	3.4600e-003	7.6000e-004	4.2200e-003	1.0000e-003	7.3000e-004	1.7300e-003	0.0000	14.3907	14.3907	1.3100e-003	0.0000	14.4235
Worker	0.0112	8.2800e-003	0.0822	1.7000e-004	0.0153	1.2000e-004	0.0154	4.0500e-003	1.1000e-004	4.1700e-003	0.0000	14.9570	14.9570	5.9000e-004	0.0000	14.9717
Total	**0.0145**	**0.0866**	**0.1003**	**3.2000e-004**	**0.0187**	**8.8000e-004**	**0.0196**	**5.0500e-003**	**8.4000e-004**	**5.9000e-003**	**0.0000**	**29.3476**	**29.3476**	**1.9000e-003**	**0.0000**	**29.3953**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0128	0.1052	0.0807	1.3000e-004		7.3700e-003	7.3700e-003		7.0900e-003	7.0900e-003	0.0000	11.1003	11.1003	1.8500e-003	0.0000	11.1465
Total	**0.0128**	**0.1052**	**0.0807**	**1.3000e-004**		**7.3700e-003**	**7.3700e-003**		**7.0900e-003**	**7.0900e-003**	**0.0000**	**11.1003**	**11.1003**	**1.8500e-003**	**0.0000**	**11.1465**

3.3 Building Construction - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.3100e-003	0.0783	0.0181	1.5000e-004	3.4600e-003	7.6000e-004	4.2200e-003	1.0000e-003	7.3000e-004	1.7300e-003	0.0000	14.3907	14.3907	1.3100e-003	0.0000	14.4235
Worker	0.0112	8.2800e-003	0.0822	1.7000e-004	0.0153	1.2000e-004	0.0154	4.0500e-003	1.1000e-004	4.1700e-003	0.0000	14.9570	14.9570	5.9000e-004	0.0000	14.9717
Total	**0.0145**	**0.0866**	**0.1003**	**3.2000e-004**	**0.0187**	**8.8000e-004**	**0.0196**	**5.0500e-003**	**8.4000e-004**	**5.9000e-003**	**0.0000**	**29.3476**	**29.3476**	**1.9000e-003**	**0.0000**	**29.3953**

3.3 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4830	4.0990	3.4429	5.4900e-003		0.2728	0.2728		0.2626	0.2626	0.0000	479.9793	479.9793	0.0774	0.0000	481.9141
Total	**0.4830**	**4.0990**	**3.4429**	**5.4900e-003**		**0.2728**	**0.2728**		**0.2626**	**0.2626**	**0.0000**	**479.9793**	**479.9793**	**0.0774**	**0.0000**	**481.9141**

3.3 Building Construction - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1247	3.2031	0.6842	6.5700e-003	0.1505	0.0270	0.1775	0.0435	0.0258	0.0693	0.0000	623.5869	623.5869	0.0533	0.0000	624.9181
Worker	0.4296	0.3107	3.0964	7.0200e-003	0.6636	5.0500e-003	0.6686	0.1764	4.6500e-003	0.1810	0.0000	633.5794	633.5794	0.0224	0.0000	634.1396
Total	**0.5542**	**3.5139**	**3.7805**	**0.0136**	**0.8141**	**0.0320**	**0.8461**	**0.2198**	**0.0304**	**0.2503**	**0.0000**	**1,257.1662**	**1,257.1662**	**0.0757**	**0.0000**	**1,259.0577**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4830	4.0990	3.4429	5.4900e-003		0.2728	0.2728		0.2626	0.2626	0.0000	479.9787	479.9787	0.0774	0.0000	481.9136
Total	**0.4830**	**4.0990**	**3.4429**	**5.4900e-003**		**0.2728**	**0.2728**		**0.2626**	**0.2626**	**0.0000**	**479.9787**	**479.9787**	**0.0774**	**0.0000**	**481.9136**

3.3 Building Construction - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1247	3.2031	0.6842	6.5700e-003	0.1505	0.0270	0.1775	0.0435	0.0258	0.0693	0.0000	623.5869	623.5869	0.0533	0.0000	624.9181
Worker	0.4296	0.3107	3.0964	7.0200e-003	0.6636	5.0500e-003	0.6686	0.1764	4.6500e-003	0.1810	0.0000	633.5794	633.5794	0.0224	0.0000	634.1396
Total	**0.5542**	**3.5139**	**3.7805**	**0.0136**	**0.8141**	**0.0320**	**0.8461**	**0.2198**	**0.0304**	**0.2503**	**0.0000**	**1,257.1662**	**1,257.1662**	**0.0757**	**0.0000**	**1,259.0577**

3.3 Building Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4258	3.7277	3.3980	5.4900e-003		0.2353	0.2353		0.2265	0.2265	0.0000	477.1549	477.1549	0.0745	0.0000	479.0168
Total	**0.4258**	**3.7277**	**3.3980**	**5.4900e-003**		**0.2353**	**0.2353**		**0.2265**	**0.2265**	**0.0000**	**477.1549**	**477.1549**	**0.0745**	**0.0000**	**479.0168**

3.3 Building Construction - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1109	3.0283	0.6084	6.5100e-003	0.1505	0.0229	0.1734	0.0435	0.0219	0.0654	0.0000	618.3685	618.3685	0.0516	0.0000	619.6584
Worker	0.3859	0.2710	2.7238	6.8100e-003	0.6636	4.8900e-003	0.6684	0.1764	4.5000e-003	0.1809	0.0000	614.8987	614.8987	0.0197	0.0000	615.3902
Total	**0.4968**	**3.2992**	**3.3322**	**0.0133**	**0.8141**	**0.0278**	**0.8418**	**0.2199**	**0.0264**	**0.2462**	**0.0000**	**1,233.2672**	**1,233.2672**	**0.0713**	**0.0000**	**1,235.0486**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4258	3.7276	3.3980	5.4900e-003		0.2353	0.2353		0.2265	0.2265	0.0000	477.1544	477.1544	0.0745	0.0000	479.0163
Total	**0.4258**	**3.7276**	**3.3980**	**5.4900e-003**		**0.2353**	**0.2353**		**0.2265**	**0.2265**	**0.0000**	**477.1544**	**477.1544**	**0.0745**	**0.0000**	**479.0163**

3.3 Building Construction - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1109	3.0283	0.6084	6.5100e-003	0.1505	0.0229	0.1734	0.0435	0.0219	0.0654	0.0000	618.3685	618.3685	0.0516	0.0000	619.6584
Worker	0.3859	0.2710	2.7238	6.8100e-003	0.6636	4.8900e-003	0.6684	0.1764	4.5000e-003	0.1809	0.0000	614.8987	614.8987	0.0197	0.0000	615.3902
Total	**0.4968**	**3.2992**	**3.3322**	**0.0133**	**0.8141**	**0.0278**	**0.8418**	**0.2199**	**0.0264**	**0.2462**	**0.0000**	**1,233.2672**	**1,233.2672**	**0.0713**	**0.0000**	**1,235.0486**

3.3 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3841	3.4220	3.3771	5.5100e-003		0.2050	0.2050		0.1973	0.1973	0.0000	475.2559	475.2559	0.0724	0.0000	477.0667
Total	**0.3841**	**3.4220**	**3.3771**	**5.5100e-003**		**0.2050**	**0.2050**		**0.1973**	**0.1973**	**0.0000**	**475.2559**	**475.2559**	**0.0724**	**0.0000**	**477.0667**

3.3 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0903	2.7746	0.5262	6.4800e-003	0.1511	0.0153	0.1664	0.0437	0.0146	0.0583	0.0000	615.4830	615.4830	0.0486	0.0000	616.6979
Worker	0.3522	0.2391	2.4295	6.6200e-003	0.6661	4.7500e-003	0.6708	0.1770	4.3700e-003	0.1814	0.0000	598.1513	598.1513	0.0171	0.0000	598.5797
Total	**0.4425**	**3.0137**	**2.9557**	**0.0131**	**0.8172**	**0.0200**	**0.8372**	**0.2207**	**0.0190**	**0.2397**	**0.0000**	**1,213.6343**	**1,213.6343**	**0.0657**	**0.0000**	**1,215.2776**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3841	3.4220	3.3771	5.5100e-003		0.2050	0.2050		0.1973	0.1973	0.0000	475.2553	475.2553	0.0724	0.0000	477.0661
Total	**0.3841**	**3.4220**	**3.3771**	**5.5100e-003**		**0.2050**	**0.2050**		**0.1973**	**0.1973**	**0.0000**	**475.2553**	**475.2553**	**0.0724**	**0.0000**	**477.0661**

3.3 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0903	2.7746	0.5262	6.4800e-003	0.1511	0.0153	0.1664	0.0437	0.0146	0.0583	0.0000	615.4830	615.4830	0.0486	0.0000	616.6979
Worker	0.3522	0.2391	2.4295	6.6200e-003	0.6661	4.7500e-003	0.6708	0.1770	4.3700e-003	0.1814	0.0000	598.1513	598.1513	0.0171	0.0000	598.5797
Total	**0.4425**	**3.0137**	**2.9557**	**0.0131**	**0.8172**	**0.0200**	**0.8372**	**0.2207**	**0.0190**	**0.2397**	**0.0000**	**1,213.6343**	**1,213.6343**	**0.0657**	**0.0000**	**1,215.2776**

3.3 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1708	1.5435	1.6597	2.7400e-003		0.0871	0.0871		0.0838	0.0838	0.0000	235.8284	235.8284	0.0351	0.0000	236.7049
Total	**0.1708**	**1.5435**	**1.6597**	**2.7400e-003**		**0.0871**	**0.0871**		**0.0838**	**0.0838**	**0.0000**	**235.8284**	**235.8284**	**0.0351**	**0.0000**	**236.7049**

3.3 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0365	1.2470	0.2275	3.1800e-003	0.0750	3.5100e-003	0.0785	0.0217	3.3600e-003	0.0250	0.0000	302.5551	302.5551	0.0231	0.0000	303.1326
Worker	0.1610	0.1055	1.0934	3.1700e-003	0.3305	2.2700e-003	0.3328	0.0878	2.0900e-003	0.0899	0.0000	286.4753	286.4753	7.5700e-003	0.0000	286.6646
Total	**0.1975**	**1.3525**	**1.3209**	**6.3500e-003**	**0.4055**	**5.7800e-003**	**0.4113**	**0.1095**	**5.4500e-003**	**0.1150**	**0.0000**	**589.0304**	**589.0304**	**0.0307**	**0.0000**	**589.7972**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1708	1.5435	1.6597	2.7400e-003		0.0871	0.0871		0.0838	0.0838	0.0000	235.8281	235.8281	0.0351	0.0000	236.7046
Total	**0.1708**	**1.5435**	**1.6597**	**2.7400e-003**		**0.0871**	**0.0871**		**0.0838**	**0.0838**	**0.0000**	**235.8281**	**235.8281**	**0.0351**	**0.0000**	**236.7046**

3.3 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0365	1.2470	0.2275	3.1800e-003	0.0750	3.5100e-003	0.0785	0.0217	3.3600e-003	0.0250	0.0000	302.5551	302.5551	0.0231	0.0000	303.1326
Worker	0.1610	0.1055	1.0934	3.1700e-003	0.3305	2.2700e-003	0.3328	0.0878	2.0900e-003	0.0899	0.0000	286.4753	286.4753	7.5700e-003	0.0000	286.6646
Total	**0.1975**	**1.3525**	**1.3209**	**6.3500e-003**	**0.4055**	**5.7800e-003**	**0.4113**	**0.1095**	**5.4500e-003**	**0.1150**	**0.0000**	**589.0304**	**589.0304**	**0.0307**	**0.0000**	**589.7972**

3.4 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.0000e-004	0.0000	4.0000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.0800e-003	0.0108	5.8600e-003	1.0000e-005		5.8000e-004	5.8000e-004		5.4000e-004	5.4000e-004	0.0000	0.9047	0.9047	2.2000e-004	0.0000	0.9102
Total	**1.0800e-003**	**0.0108**	**5.8600e-003**	**1.0000e-005**	**4.0000e-004**	**5.8000e-004**	**9.8000e-004**	**6.0000e-005**	**5.4000e-004**	**6.0000e-004**	**0.0000**	**0.9047**	**0.9047**	**2.2000e-004**	**0.0000**	**0.9102**

3.4 Demolition - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	6.8000e-004	1.0000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1567	0.1567	1.0000e-005	0.0000	0.1570
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-005	2.0000e-005	1.7000e-004	0.0000	3.0000e-005	0.0000	3.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0314	0.0314	0.0000	0.0000	0.0314
Total	**4.0000e-005**	**7.0000e-004**	**2.7000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**7.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.1881**	**0.1881**	**1.0000e-005**	**0.0000**	**0.1884**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.6000e-004	0.0000	1.6000e-004	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.0800e-003	0.0108	5.8600e-003	1.0000e-005		5.8000e-004	5.8000e-004		5.4000e-004	5.4000e-004	0.0000	0.9047	0.9047	2.2000e-004	0.0000	0.9102
Total	**1.0800e-003**	**0.0108**	**5.8600e-003**	**1.0000e-005**	**1.6000e-004**	**5.8000e-004**	**7.4000e-004**	**2.0000e-005**	**5.4000e-004**	**5.6000e-004**	**0.0000**	**0.9047**	**0.9047**	**2.2000e-004**	**0.0000**	**0.9102**

3.4 Demolition - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	6.8000e-004	1.0000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1567	0.1567	1.0000e-005	0.0000	0.1570
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-005	2.0000e-005	1.7000e-004	0.0000	3.0000e-005	0.0000	3.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0314	0.0314	0.0000	0.0000	0.0314
Total	**4.0000e-005**	**7.0000e-004**	**2.7000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**7.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.1881**	**0.1881**	**1.0000e-005**	**0.0000**	**0.1884**

3.5 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.7392	0.0000	0.7392	0.3458	0.0000	0.3458	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.4111	4.8306	2.6021	4.3800e-003		0.2178	0.2178		0.2004	0.2004	0.0000	406.2328	406.2328	0.1245	0.0000	409.3445
Total	**0.4111**	**4.8306**	**2.6021**	**4.3800e-003**	**0.7392**	**0.2178**	**0.9570**	**0.3458**	**0.2004**	**0.5462**	**0.0000**	**406.2328**	**406.2328**	**0.1245**	**0.0000**	**409.3445**

3.5 Grading - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.7900e-003	6.5100e-003	0.0647	1.3000e-004	0.0120	1.0000e-004	0.0121	3.1900e-003	9.0000e-005	3.2800e-003	0.0000	11.7586	11.7586	4.6000e-004	0.0000	11.7702
Total	**8.7900e-003**	**6.5100e-003**	**0.0647**	**1.3000e-004**	**0.0120**	**1.0000e-004**	**0.0121**	**3.1900e-003**	**9.0000e-005**	**3.2800e-003**	**0.0000**	**11.7586**	**11.7586**	**4.6000e-004**	**0.0000**	**11.7702**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2883	0.0000	0.2883	0.1349	0.0000	0.1349	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.4111	4.8306	2.6021	4.3800e-003		0.2178	0.2178		0.2004	0.2004	0.0000	406.2323	406.2323	0.1245	0.0000	409.3440
Total	**0.4111**	**4.8306**	**2.6021**	**4.3800e-003**	**0.2883**	**0.2178**	**0.5061**	**0.1349**	**0.2004**	**0.3353**	**0.0000**	**406.2323**	**406.2323**	**0.1245**	**0.0000**	**409.3440**

3.5 Grading - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.7900e-003	6.5100e-003	0.0647	1.3000e-004	0.0120	1.0000e-004	0.0121	3.1900e-003	9.0000e-005	3.2800e-003	0.0000	11.7586	11.7586	4.6000e-004	0.0000	11.7702
Total	**8.7900e-003**	**6.5100e-003**	**0.0647**	**1.3000e-004**	**0.0120**	**1.0000e-004**	**0.0121**	**3.1900e-003**	**9.0000e-005**	**3.2800e-003**	**0.0000**	**11.7586**	**11.7586**	**4.6000e-004**	**0.0000**	**11.7702**

3.6 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0272	0.2901	0.2105	3.2000e-004		0.0162	0.0162		0.0149	0.0149	0.0000	29.6006	29.6006	9.0700e-003	0.0000	29.8273
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0272**	**0.2901**	**0.2105**	**3.2000e-004**		**0.0162**	**0.0162**		**0.0149**	**0.0149**	**0.0000**	**29.6006**	**29.6006**	**9.0700e-003**	**0.0000**	**29.8273**

3.6 Paving - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2300e-003	9.1000e-004	9.0500e-003	2.0000e-005	1.6800e-003	1.0000e-005	1.6900e-003	4.5000e-004	1.0000e-005	4.6000e-004	0.0000	1.6462	1.6462	6.0000e-005	0.0000	1.6478
Total	**1.2300e-003**	**9.1000e-004**	**9.0500e-003**	**2.0000e-005**	**1.6800e-003**	**1.0000e-005**	**1.6900e-003**	**4.5000e-004**	**1.0000e-005**	**4.6000e-004**	**0.0000**	**1.6462**	**1.6462**	**6.0000e-005**	**0.0000**	**1.6478**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0272	0.2901	0.2105	3.2000e-004		0.0162	0.0162		0.0149	0.0149	0.0000	29.6005	29.6005	9.0700e-003	0.0000	29.8273
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0272**	**0.2901**	**0.2105**	**3.2000e-004**		**0.0162**	**0.0162**		**0.0149**	**0.0149**	**0.0000**	**29.6005**	**29.6005**	**9.0700e-003**	**0.0000**	**29.8273**

3.6 Paving - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2300e-003	9.1000e-004	9.0500e-003	2.0000e-005	1.6800e-003	1.0000e-005	1.6900e-003	4.5000e-004	1.0000e-005	4.6000e-004	0.0000	1.6462	1.6462	6.0000e-005	0.0000	1.6478
Total	**1.2300e-003**	**9.1000e-004**	**9.0500e-003**	**2.0000e-005**	**1.6800e-003**	**1.0000e-005**	**1.6900e-003**	**4.5000e-004**	**1.0000e-005**	**4.6000e-004**	**0.0000**	**1.6462**	**1.6462**	**6.0000e-005**	**0.0000**	**1.6478**

3.6 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0477	0.5081	0.4291	6.6000e-004		0.0277	0.0277		0.0255	0.0255	0.0000	60.3537	60.3537	0.0188	0.0000	60.8234
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0477**	**0.5081**	**0.4291**	**6.6000e-004**		**0.0277**	**0.0277**		**0.0255**	**0.0255**	**0.0000**	**60.3537**	**60.3537**	**0.0188**	**0.0000**	**60.8234**

3.6 Paving - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.2500e-003	1.6300e-003	0.0162	4.0000e-005	3.4800e-003	3.0000e-005	3.5000e-003	9.2000e-004	2.0000e-005	9.5000e-004	0.0000	3.3207	3.3207	1.2000e-004	0.0000	3.3236
Total	**2.2500e-003**	**1.6300e-003**	**0.0162**	**4.0000e-005**	**3.4800e-003**	**3.0000e-005**	**3.5000e-003**	**9.2000e-004**	**2.0000e-005**	**9.5000e-004**	**0.0000**	**3.3207**	**3.3207**	**1.2000e-004**	**0.0000**	**3.3236**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0477	0.5081	0.4291	6.6000e-004		0.0277	0.0277		0.0255	0.0255	0.0000	60.3536	60.3536	0.0188	0.0000	60.8234
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0477**	**0.5081**	**0.4291**	**6.6000e-004**		**0.0277**	**0.0277**		**0.0255**	**0.0255**	**0.0000**	**60.3536**	**60.3536**	**0.0188**	**0.0000**	**60.8234**

3.6 Paving - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.2500e-003	1.6300e-003	0.0162	4.0000e-005	3.4800e-003	3.0000e-005	3.5000e-003	9.2000e-004	2.0000e-005	9.5000e-004	0.0000	3.3207	3.3207	1.2000e-004	0.0000	3.3236
Total	**2.2500e-003**	**1.6300e-003**	**0.0162**	**4.0000e-005**	**3.4800e-003**	**3.0000e-005**	**3.5000e-003**	**9.2000e-004**	**2.0000e-005**	**9.5000e-004**	**0.0000**	**3.3207**	**3.3207**	**1.2000e-004**	**0.0000**	**3.3236**

3.7 Site Preparation - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3718	0.0000	0.3718	0.1439	0.0000	0.1439	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0645	0.6796	0.3049	4.9000e-004		0.0374	0.0374		0.0344	0.0344	0.0000	45.9347	45.9347	0.0141	0.0000	46.2866
Total	**0.0645**	**0.6796**	**0.3049**	**4.9000e-004**	**0.3718**	**0.0374**	**0.4092**	**0.1439**	**0.0344**	**0.1783**	**0.0000**	**45.9347**	**45.9347**	**0.0141**	**0.0000**	**46.2866**

3.7 Site Preparation - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3700e-003	1.0200e-003	0.0101	2.0000e-005	1.8700e-003	1.0000e-005	1.8900e-003	5.0000e-004	1.0000e-005	5.1000e-004	0.0000	1.8343	1.8343	7.0000e-005	0.0000	1.8362
Total	**1.3700e-003**	**1.0200e-003**	**0.0101**	**2.0000e-005**	**1.8700e-003**	**1.0000e-005**	**1.8900e-003**	**5.0000e-004**	**1.0000e-005**	**5.1000e-004**	**0.0000**	**1.8343**	**1.8343**	**7.0000e-005**	**0.0000**	**1.8362**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1450	0.0000	0.1450	0.0561	0.0000	0.0561	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0645	0.6796	0.3049	4.9000e-004		0.0374	0.0374		0.0344	0.0344	0.0000	45.9347	45.9347	0.0141	0.0000	46.2865
Total	**0.0645**	**0.6796**	**0.3049**	**4.9000e-004**	**0.1450**	**0.0374**	**0.1824**	**0.0561**	**0.0344**	**0.0906**	**0.0000**	**45.9347**	**45.9347**	**0.0141**	**0.0000**	**46.2865**

3.7 Site Preparation - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3700e-003	1.0200e-003	0.0101	2.0000e-005	1.8700e-003	1.0000e-005	1.8900e-003	5.0000e-004	1.0000e-005	5.1000e-004	0.0000	1.8343	1.8343	7.0000e-005	0.0000	1.8362
Total	**1.3700e-003**	**1.0200e-003**	**0.0101**	**2.0000e-005**	**1.8700e-003**	**1.0000e-005**	**1.8900e-003**	**5.0000e-004**	**1.0000e-005**	**5.1000e-004**	**0.0000**	**1.8343**	**1.8343**	**7.0000e-005**	**0.0000**	**1.8362**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Density

Improve Walkability Design

Improve Destination Accessibility

Increase Transit Accessibility

Improve Pedestrian Network

Provide Traffic Calming Measures

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	8.2354	81.7478	77.4821	0.3021	16.5148	0.3991	16.9140	4.4440	0.3786	4.8226	0.0000	28,021.8889	28,021.8889	2.3109	0.0000	28,079.6615
Unmitigated	8.5440	85.5607	83.2756	0.3286	18.2990	0.4365	18.7355	4.9241	0.4140	5.3381	0.0000	30,476.6123	30,476.6123	2.3808	0.0000	30,536.1327

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Low Rise	1,847.30	2,076.40	1760.30	5,411,963	4,884,296
Regional Shopping Center	9,729.95	11,884.76	6003.03	16,665,803	15,040,887
Single Family Housing	8,892.00	9,662.25	8404.50	25,884,438	23,360,705
Total	20,469.25	23,623.41	16,167.83	47,962,203	43,285,889

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Low Rise	10.80	7.30	7.50	45.60	19.00	35.40	86	11	3
Regional Shopping Center	9.50	7.30	7.30	16.30	64.70	19.00	54	35	11
Single Family Housing	10.80	7.30	7.50	45.60	19.00	35.40	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Low Rise	0.492402	0.034496	0.167383	0.136948	0.023406	0.006040	0.021602	0.106741	0.001802	0.001770	0.005495	0.001006	0.000911
Single Family Housing	0.492402	0.034496	0.167383	0.136948	0.023406	0.006040	0.021602	0.106741	0.001802	0.001770	0.005495	0.001006	0.000911
Regional Shopping Center	0.492402	0.034496	0.167383	0.136948	0.023406	0.006040	0.021602	0.106741	0.001802	0.001770	0.005495	0.001006	0.000911

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

Install High Efficiency Lighting

Install Energy Efficient Appliances

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	3,525.9809	3,525.9809	0.1594	0.0330	3,539.7967
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	3,816.8164	3,816.8164	0.1726	0.0357	3,831.7719
NaturalGas Mitigated	0.1802	1.5469	0.7068	9.8300e-003		0.1245	0.1245		0.1245	0.1245	0.0000	1,783.3197	1,783.3197	0.0342	0.0327	1,793.9171
NaturalGas Unmitigated	0.2087	1.7915	0.8191	0.0114		0.1442	0.1442		0.1442	0.1442	0.0000	2,065.2075	2,065.2075	0.0396	0.0379	2,077.4800

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Low Rise	4.71776e+006	0.0254	0.2174	0.0925	1.3900e-003		0.0176	0.0176		0.0176	0.0176	0.0000	251.7575	251.7575	4.8300e-003	4.6200e-003	253.2536
Regional Shopping Center	2.7946e+006	0.0151	0.1370	0.1151	8.2000e-004		0.0104	0.0104		0.0104	0.0104	0.0000	149.1303	149.1303	2.8600e-003	2.7300e-003	150.0165
Single Family Housing	3.11882e+007	0.1682	1.4371	0.6115	9.1700e-003		0.1162	0.1162		0.1162	0.1162	0.0000	1,664.3197	1,664.3197	0.0319	0.0305	1,674.2099
Total		**0.2087**	**1.7915**	**0.8191**	**0.0114**		**0.1442**	**0.1442**		**0.1442**	**0.1442**	**0.0000**	**2,065.2075**	**2,065.2075**	**0.0396**	**0.0379**	**2,077.4800**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Low Rise	4.12698e+006	0.0223	0.1902	0.0809	1.2100e-003		0.0154	0.0154		0.0154	0.0154	0.0000	220.2313	220.2313	4.2200e-003	4.0400e-003	221.5400
Regional Shopping Center	2.38825e+006	0.0129	0.1171	0.0983	7.0000e-004		8.9000e-003	8.9000e-003		8.9000e-003	8.9000e-003	0.0000	127.4461	127.4461	2.4400e-003	2.3400e-003	128.2035
Single Family Housing	2.69029e+007	0.1451	1.2396	0.5275	7.9100e-003		0.1002	0.1002		0.1002	0.1002	0.0000	1,435.6423	1,435.6423	0.0275	0.0263	1,444.1736
Total		**0.1802**	**1.5469**	**0.7068**	**9.8200e-003**		**0.1245**	**0.1245**		**0.1245**	**0.1245**	**0.0000**	**1,783.3197**	**1,783.3197**	**0.0342**	**0.0327**	**1,793.9171**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Low Rise	1.40112e+006	407.6020	0.0184	3.8100e-003	409.1991
Regional Shopping Center	2.88735e+006	839.9642	0.0380	7.8600e-003	843.2554
Single Family Housing	8.83173e+006	2,569.2502	0.1162	0.0240	2,579.3173
Total		**3,816.8164**	**0.1726**	**0.0357**	**3,831.7719**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Low Rise	1.30565e+006	379.8287	0.0172	3.5500e-003	381.3170
Regional Shopping Center	2.51043e+006	730.3122	0.0330	6.8300e-003	733.1738
Single Family Housing	8.30438e+006	2,415.8400	0.1092	0.0226	2,425.3060
Total		**3,525.9809**	**0.1594**	**0.0330**	**3,539.7967**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

Use Low VOC Paint - Non-Residential Interior

Use Low VOC Paint - Non-Residential Exterior

Use only Natural Gas Hearths

Use Low VOC Cleaning Supplies

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	10.6783	0.5825	9.6429	3.5200e-003		0.0900	0.0900		0.0900	0.0900	0.0000	563.3545	563.3545	0.0256	0.0101	566.9879
Unmitigated	11.3449	0.5825	9.6429	3.5200e-003		0.0900	0.0900		0.0900	0.0900	0.0000	563.3545	563.3545	0.0256	0.0101	566.9879

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.0848					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	8.9156					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0554	0.4732	0.2014	3.0200e-003		0.0383	0.0383		0.0383	0.0383	0.0000	548.0074	548.0074	0.0105	0.0101	551.2639
Landscaping	0.2892	0.1094	9.4415	5.0000e-004		0.0517	0.0517		0.0517	0.0517	0.0000	15.3472	15.3472	0.0151	0.0000	15.7240
Total	**11.3449**	**0.5825**	**9.6429**	**3.5200e-003**		**0.0900**	**0.0900**		**0.0900**	**0.0900**	**0.0000**	**563.3545**	**563.3545**	**0.0256**	**0.0101**	**566.9879**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.0848					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	8.2490					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0554	0.4732	0.2014	3.0200e-003		0.0383	0.0383		0.0383	0.0383	0.0000	548.0074	548.0074	0.0105	0.0101	551.2639
Landscaping	0.2892	0.1094	9.4415	5.0000e-004		0.0517	0.0517		0.0517	0.0517	0.0000	15.3472	15.3472	0.0151	0.0000	15.7240
Total	**10.6783**	**0.5825**	**9.6429**	**3.5200e-003**		**0.0900**	**0.0900**		**0.0900**	**0.0900**	**0.0000**	**563.3545**	**563.3545**	**0.0256**	**0.0101**	**566.9879**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	211.3682	2.6162	0.0633	295.6407
Unmitigated	253.1077	3.2697	0.0790	358.4047

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Low Rise	18.8947 / 11.9119	47.8655	0.6176	0.0149	67.7538
Regional Shopping Center	17.6174 / 10.7978	44.3153	0.5758	0.0139	62.8580
Single Family Housing	63.5252 / 40.0485	160.9270	2.0763	0.0502	227.7929
Total		**253.1077**	**3.2697**	**0.0790**	**358.4047**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Low Rise	15.1157 / 11.1852	39.9782	0.4941	0.0120	55.8955
Regional Shopping Center	14.0939 / 10.1391	36.9805	0.4607	0.0112	51.8206
Single Family Housing	50.8201 / 37.6055	134.4096	1.6613	0.0402	187.9246
Total		**211.3682**	**2.6162**	**0.0633**	**295.6407**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	310.8685	18.3718	0.0000	770.1635
Unmitigated	310.8685	18.3718	0.0000	770.1635

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Low Rise	133.4	27.0790	1.6003	0.0000	67.0871
Regional Shopping Center	249.73	50.6929	2.9959	0.0000	125.5896
Single Family Housing	1148.31	233.0966	13.7756	0.0000	577.4868
Total		**310.8685**	**18.3718**	**0.0000**	**770.1635**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Low Rise	133.4	27.0790	1.6003	0.0000	67.0871
Regional Shopping Center	249.73	50.6929	2.9959	0.0000	125.5896
Single Family Housing	1148.31	233.0966	13.7756	0.0000	577.4868
Total		**310.8685**	**18.3718**	**0.0000**	**770.1635**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

	Total CO2	CH4	N2O	CO2e
Category	MT			
Unmitigated	-1,474.9800	0.0000	0.0000	-1,474.9800

11.1 Vegetation Land Change

Vegetation Type

	Initial/Final	Total CO2	CH4	N2O	CO2e
	Acres	MT			
Cropland	237.9 / 0	-1,474.9800	0.0000	0.0000	-1,474.9800
Total		**-1,474.9800**	**0.0000**	**0.0000**	**-1,474.9800**

Oakwood Landing

San Joaquin Valley Unified APCD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Low Rise	290.00	Dwelling Unit	11.59	290,000.00	908
Single Family Housing	975.00	Dwelling Unit	226.93	1,755,000.00	3052
Regional Shopping Center	237.84	1000sqft	13.00	237,838.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	45
Climate Zone	2			**Operational Year**	2005
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - See assumptions in Appendix B

Land Use - See assumptions in Appendix B

Construction Phase - See assumptions in Appendix B

Off-road Equipment - See assumptions in Appendix B

Off-road Equipment - See assumptions in Appendix B4

Off-road Equipment - See assumptions in Appendix B

Off-road Equipment - See assumptions in Appendix B

Off-road Equipment -

Off-road Equipment -

Demolition - See assumptions in Appendix B

Grading - See assumptions in Appendix B

Vehicle Trips - See assumptions in Appendix B

Land Use Change - See assumptions in Appendix B

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Area Mitigation -

Energy Mitigation -

Water Mitigation -

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_EF_Nonresidential_Exterior	250	150
tblAreaCoating	Area_EF_Nonresidential_Interior	250	150
tblAreaCoating	Area_EF_Residential_Exterior	250	150
tblAreaCoating	Area_EF_Residential_Interior	250	150
tblAreaMitigation	UseLowVOCPaintParkingCheck	False	True
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	5

Oakwood Landing - San Joaquin Valley Unified APCD Air District, Annual

tblConstructionPhase	NumDays	330.00	920.00
tblConstructionPhase	NumDays	4,650.00	920.00
tblConstructionPhase	NumDays	300.00	1.00
tblConstructionPhase	NumDays	465.00	100.00
tblConstructionPhase	NumDays	330.00	86.00
tblConstructionPhase	NumDays	180.00	26.00
tblGrading	AcresOfGrading	300.00	258.29
tblGrading	AcresOfGrading	0.00	258.29
tblLandUse	BuildingSpaceSquareFeet	237,840.00	237,838.00
tblLandUse	LandUseSquareFeet	237,840.00	237,838.00
tblLandUse	LotAcreage	18.13	11.59
tblLandUse	LotAcreage	316.56	226.93
tblLandUse	LotAcreage	5.46	13.00
tblLandUse	Population	920.00	908.00
tblLandUse	Population	3,093.00	3,052.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	UsageHours	7.00	3.00
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblProjectCharacteristics	OperationalYear	2018	2005

tblVehicleTrips	WD_TR	6.59	6.37
tblVehicleTrips	WD_TR	42.70	40.91
tblVehicleTrips	WD_TR	9.52	9.12
tblWoodstoves	NumberCatalytic	11.59	0.00
tblWoodstoves	NumberCatalytic	226.93	0.00
tblWoodstoves	NumberNoncatalytic	11.59	0.00
tblWoodstoves	NumberNoncatalytic	226.93	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.6005	6.3282	3.7419	6.8800e-003	1.2033	0.2903	1.4936	0.5145	0.2685	0.7830	0.0000	635.3864	635.3864	0.1549	0.0000	639.2600
2018	1.0372	7.6128	7.2234	0.0191	0.8141	0.3048	1.1189	0.2199	0.2930	0.5128	0.0000	1,737.1455	1,737.1455	0.1531	0.0000	1,740.9718
2019	0.9226	7.0269	6.7301	0.0188	0.8141	0.2631	1.0772	0.2199	0.2529	0.4727	0.0000	1,710.4221	1,710.4221	0.1457	0.0000	1,714.0655
2020	0.8266	6.4357	6.3328	0.0186	0.8172	0.2250	1.0422	0.2207	0.2163	0.4369	0.0000	1,688.8902	1,688.8902	0.1382	0.0000	1,692.3443
2021	1.8440	3.0891	3.3578	9.2000e-003	0.3839	0.1117	0.4956	0.1035	0.1063	0.2098	0.0000	831.2060	831.2060	0.0854	0.0000	833.3409
2022	5.9779	0.2207	0.6337	1.6100e-003	0.1320	0.0115	0.1435	0.0351	0.0114	0.0465	0.0000	143.5137	143.5137	4.8600e-003	0.0000	143.6351
2023	5.9720	0.2030	0.5980	1.5600e-003	0.1320	0.0101	0.1421	0.0351	9.9900e-003	0.0451	0.0000	139.3995	139.3995	4.3900e-003	0.0000	139.5092
2024	6.0128	0.1901	0.5742	1.5300e-003	0.1330	8.8200e-003	0.1418	0.0354	8.7600e-003	0.0441	0.0000	136.4032	136.4032	4.0600e-003	0.0000	136.5048
2025	1.6970	0.0502	0.1546	4.2000e-004	0.0376	2.1400e-003	0.0397	9.9900e-003	2.1200e-003	0.0121	0.0000	37.3771	37.3771	1.0700e-003	0.0000	37.4039
Maximum	**6.0128**	**7.6128**	**7.2234**	**0.0191**	**1.2033**	**0.3048**	**1.4936**	**0.5145**	**0.2930**	**0.7830**	**0.0000**	**1,737.1455**	**1,737.1455**	**0.1549**	**0.0000**	**1,740.9718**

2.1 Overall Construction

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.6005	6.3282	3.7419	6.8800e-003	0.5254	0.2903	0.8157	0.2158	0.2685	0.4843	0.0000	635.3858	635.3858	0.1549	0.0000	639.2594
2018	1.0372	7.6128	7.2234	0.0191	0.8141	0.3048	1.1189	0.2199	0.2930	0.5128	0.0000	1,737.1450	1,737.1450	0.1531	0.0000	1,740.9713
2019	0.9226	7.0269	6.7301	0.0188	0.8141	0.2631	1.0772	0.2199	0.2529	0.4727	0.0000	1,710.4215	1,710.4215	0.1457	0.0000	1,714.0649
2020	0.8266	6.4357	6.3328	0.0186	0.8172	0.2250	1.0422	0.2207	0.2163	0.4369	0.0000	1,688.8897	1,688.8897	0.1382	0.0000	1,692.3437
2021	1.8440	3.0891	3.3578	9.2000e-003	0.3839	0.1117	0.4956	0.1035	0.1063	0.2098	0.0000	831.2057	831.2057	0.0854	0.0000	833.3406
2022	5.9779	0.2207	0.6337	1.6100e-003	0.1320	0.0115	0.1435	0.0351	0.0114	0.0465	0.0000	143.5136	143.5136	4.8600e-003	0.0000	143.6351
2023	5.9720	0.2030	0.5980	1.5600e-003	0.1320	0.0101	0.1421	0.0351	9.9900e-003	0.0451	0.0000	139.3994	139.3994	4.3900e-003	0.0000	139.5092
2024	6.0128	0.1901	0.5742	1.5300e-003	0.1330	8.8200e-003	0.1418	0.0354	8.7600e-003	0.0441	0.0000	136.4031	136.4031	4.0600e-003	0.0000	136.5047
2025	1.6970	0.0502	0.1546	4.2000e-004	0.0376	2.1400e-003	0.0397	9.9900e-003	2.1200e-003	0.0121	0.0000	37.3771	37.3771	1.0700e-003	0.0000	37.4039
Maximum	**6.0128**	**7.6128**	**7.2234**	**0.0191**	**0.8172**	**0.3048**	**1.1189**	**0.2207**	**0.2930**	**0.5128**	**0.0000**	**1,737.1450**	**1,737.1450**	**0.1549**	**0.0000**	**1,740.9713**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**15.18**	**0.00**	**11.91**	**21.43**	**0.00**	**11.66**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	6-1-2017	8-31-2017	2.8128	2.8128

2	**9-1-2017**	**11-30-2017**	3.3500	3.3500
3	**12-1-2017**	**2-28-2018**	2.2210	2.2210
4	**3-1-2018**	**5-31-2018**	2.1790	2.1790
5	**6-1-2018**	**8-31-2018**	2.1719	2.1719
6	**9-1-2018**	**11-30-2018**	2.1623	2.1623
7	**12-1-2018**	**2-28-2019**	2.0309	2.0309
8	**3-1-2019**	**5-31-2019**	2.0026	2.0026
9	**6-1-2019**	**8-31-2019**	1.9965	1.9965
10	**9-1-2019**	**11-30-2019**	1.9868	1.9868
11	**12-1-2019**	**2-29-2020**	1.8739	1.8739
12	**3-1-2020**	**5-31-2020**	1.8231	1.8231
13	**6-1-2020**	**8-31-2020**	1.8184	1.8184
14	**9-1-2020**	**11-30-2020**	1.8080	1.8080
15	**12-1-2020**	**2-28-2021**	1.6816	1.6816
16	**3-1-2021**	**5-31-2021**	1.6523	1.6523
17	**6-1-2021**	**8-31-2021**	0.5204	0.5204
18	**9-1-2021**	**11-30-2021**	1.1495	1.1495
19	**12-1-2021**	**2-28-2022**	1.5368	1.5368
20	**3-1-2022**	**5-31-2022**	1.5682	1.5682
21	**6-1-2022**	**8-31-2022**	1.5680	1.5680
22	**9-1-2022**	**11-30-2022**	1.5513	1.5513
23	**12-1-2022**	**2-28-2023**	1.5305	1.5305
24	**3-1-2023**	**5-31-2023**	1.5621	1.5621
25	**6-1-2023**	**8-31-2023**	1.5619	1.5619
26	**9-1-2023**	**11-30-2023**	1.5453	1.5453
27	**12-1-2023**	**2-29-2024**	1.5422	1.5422
28	**3-1-2024**	**5-31-2024**	1.5571	1.5571

29	**6-1-2024**	**8-31-2024**	1.5569	1.5569
30	**9-1-2024**	**11-30-2024**	1.5403	1.5403
31	**12-1-2024**	**2-28-2025**	1.5207	1.5207
32	**3-1-2025**	**5-31-2025**	0.7596	0.7596
		Highest	3.3500	3.3500

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	11.5274	0.6213	11.0975	3.5200e-003		0.0843	0.0843		0.0843	0.0843	0.0000	563.3545	563.3545	0.0351	0.0101	567.2258
Energy	0.2087	1.7915	0.8191	0.0114		0.1442	0.1442		0.1442	0.1442	0.0000	5,882.0240	5,882.0240	0.2122	0.0736	5,909.2519
Mobile	37.2315	227.5222	356.6393	1.6168	18.3416	5.2907	23.6323	4.9442	5.0517	9.9959	0.0000	33,231.1926	33,231.1926	7.6492	0.0000	33,422.4227
Waste						0.0000	0.0000		0.0000	0.0000	310.8685	0.0000	310.8685	18.3718	0.0000	770.1635
Water						0.0000	0.0000		0.0000	0.0000	31.7372	221.3705	253.1077	3.2697	0.0790	358.4047
Total	**48.9676**	**229.9350**	**368.5560**	**1.6317**	**18.3416**	**5.5192**	**23.8608**	**4.9442**	**5.2802**	**10.2243**	**342.6057**	**39,897.9416**	**40,240.5473**	**29.5380**	**0.1627**	**41,027.4686**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	10.8608	0.6213	11.0975	3.5200e-003		0.0843	0.0843		0.0843	0.0843	0.0000	563.3545	563.3545	0.0351	0.0101	567.2258
Energy	0.1802	1.5469	0.7068	9.8300e-003		0.1245	0.1245		0.1245	0.1245	0.0000	5,309.3006	5,309.3006	0.1936	0.0657	5,333.7139
Mobile	35.6104	213.1243	332.6333	1.4974	16.5533	4.8804	21.4337	4.4621	4.6600	9.1221	0.0000	30,433.2351	30,433.2351	7.4196	0.0000	30,618.7252
Waste						0.0000	0.0000		0.0000	0.0000	310.8685	0.0000	310.8685	18.3718	0.0000	770.1635
Water						0.0000	0.0000		0.0000	0.0000	25.3898	185.9785	211.3682	2.6162	0.0633	295.6407
Total	**46.6514**	**215.2925**	**344.4376**	**1.5108**	**16.5533**	**5.0892**	**21.6425**	**4.4621**	**4.8687**	**9.3308**	**336.2582**	**36,491.8687**	**36,828.1269**	**28.6363**	**0.1391**	**37,585.4690**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**4.73**	**6.37**	**6.54**	**7.41**	**9.75**	**7.79**	**9.30**	**9.75**	**7.79**	**8.74**	**1.85**	**8.54**	**8.48**	**3.05**	**14.51**	**8.39**

2.3 Vegetation

Vegetation

	CO2e
Category	MT
Vegetation Land Change	-1,474.9800
Total	**-1,474.9800**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	6/1/2017	6/1/2017	5	1	
2	Site Preparation	Site Preparation	6/2/2017	7/7/2017	5	26	
3	Grading	Grading	7/8/2017	11/24/2017	5	100	
4	Paving	Paving	6/5/2021	10/4/2021	5	86	
5	Building Construction	Building Construction	11/25/2017	6/4/2021	5	920	
6	Architectural Coating	Architectural Coating	10/5/2021	4/14/2025	5	920	

Acres of Grading (Site Preparation Phase): 258.29

Acres of Grading (Grading Phase): 258.29

Acres of Paving: 0

Residential Indoor: 4,141,125; Residential Outdoor: 1,380,375; Non-Residential Indoor: 356,757; Non-Residential Outdoor: 118,919; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
	Air Compressors	4	6.00	78	0.48
Architectural Coating	Air Compressors	1	6.00	78	0.48
Building Construction	Cranes	1	3.00	231	0.29
Building Construction	Forklifts	4	8.00	89	0.20
Building Construction	Generator Sets	4	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	4	4.00	97	0.37
Building Construction	Welders	1	4.00	46	0.45
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	1	8.00	158	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Excavators	4	8.00	158	0.38
Grading	Graders	2	8.00	187	0.41
Grading	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	127.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	14	636.00	174.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	3	8.00	0.00	4.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	12	30.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.0000e-004	0.0000	4.0000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.0800e-003	0.0108	5.8600e-003	1.0000e-005		5.8000e-004	5.8000e-004		5.4000e-004	5.4000e-004	0.0000	0.9047	0.9047	2.2000e-004	0.0000	0.9102
Total	**1.0800e-003**	**0.0108**	**5.8600e-003**	**1.0000e-005**	**4.0000e-004**	**5.8000e-004**	**9.8000e-004**	**6.0000e-005**	**5.4000e-004**	**6.0000e-004**	**0.0000**	**0.9047**	**0.9047**	**2.2000e-004**	**0.0000**	**0.9102**

3.2 Demolition - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	6.8000e-004	1.0000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1567	0.1567	1.0000e-005	0.0000	0.1570
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-005	2.0000e-005	1.7000e-004	0.0000	3.0000e-005	0.0000	3.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0314	0.0314	0.0000	0.0000	0.0314
Total	**4.0000e-005**	**7.0000e-004**	**2.7000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**7.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.1881**	**0.1881**	**1.0000e-005**	**0.0000**	**0.1884**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.6000e-004	0.0000	1.6000e-004	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.0800e-003	0.0108	5.8600e-003	1.0000e-005		5.8000e-004	5.8000e-004		5.4000e-004	5.4000e-004	0.0000	0.9047	0.9047	2.2000e-004	0.0000	0.9102
Total	**1.0800e-003**	**0.0108**	**5.8600e-003**	**1.0000e-005**	**1.6000e-004**	**5.8000e-004**	**7.4000e-004**	**2.0000e-005**	**5.4000e-004**	**5.6000e-004**	**0.0000**	**0.9047**	**0.9047**	**2.2000e-004**	**0.0000**	**0.9102**

3.2 Demolition - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	6.8000e-004	1.0000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1567	0.1567	1.0000e-005	0.0000	0.1570
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-005	2.0000e-005	1.7000e-004	0.0000	3.0000e-005	0.0000	3.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0314	0.0314	0.0000	0.0000	0.0314
Total	**4.0000e-005**	**7.0000e-004**	**2.7000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**7.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.1881**	**0.1881**	**1.0000e-005**	**0.0000**	**0.1884**

3.3 Site Preparation - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3718	0.0000	0.3718	0.1439	0.0000	0.1439	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0645	0.6796	0.3049	4.9000e-004		0.0374	0.0374		0.0344	0.0344	0.0000	45.9347	45.9347	0.0141	0.0000	46.2866
Total	**0.0645**	**0.6796**	**0.3049**	**4.9000e-004**	**0.3718**	**0.0374**	**0.4092**	**0.1439**	**0.0344**	**0.1783**	**0.0000**	**45.9347**	**45.9347**	**0.0141**	**0.0000**	**46.2866**

3.3 Site Preparation - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3700e-003	1.0200e-003	0.0101	2.0000e-005	1.8700e-003	1.0000e-005	1.8900e-003	5.0000e-004	1.0000e-005	5.1000e-004	0.0000	1.8343	1.8343	7.0000e-005	0.0000	1.8362
Total	**1.3700e-003**	**1.0200e-003**	**0.0101**	**2.0000e-005**	**1.8700e-003**	**1.0000e-005**	**1.8900e-003**	**5.0000e-004**	**1.0000e-005**	**5.1000e-004**	**0.0000**	**1.8343**	**1.8343**	**7.0000e-005**	**0.0000**	**1.8362**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1450	0.0000	0.1450	0.0561	0.0000	0.0561	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0645	0.6796	0.3049	4.9000e-004		0.0374	0.0374		0.0344	0.0344	0.0000	45.9347	45.9347	0.0141	0.0000	46.2865
Total	**0.0645**	**0.6796**	**0.3049**	**4.9000e-004**	**0.1450**	**0.0374**	**0.1824**	**0.0561**	**0.0344**	**0.0906**	**0.0000**	**45.9347**	**45.9347**	**0.0141**	**0.0000**	**46.2865**

3.3 Site Preparation - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3700e-003	1.0200e-003	0.0101	2.0000e-005	1.8700e-003	1.0000e-005	1.8900e-003	5.0000e-004	1.0000e-005	5.1000e-004	0.0000	1.8343	1.8343	7.0000e-005	0.0000	1.8362
Total	**1.3700e-003**	**1.0200e-003**	**0.0101**	**2.0000e-005**	**1.8700e-003**	**1.0000e-005**	**1.8900e-003**	**5.0000e-004**	**1.0000e-005**	**5.1000e-004**	**0.0000**	**1.8343**	**1.8343**	**7.0000e-005**	**0.0000**	**1.8362**

3.4 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.7392	0.0000	0.7392	0.3458	0.0000	0.3458	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.4111	4.8306	2.6021	4.3800e-003		0.2178	0.2178		0.2004	0.2004	0.0000	406.2328	406.2328	0.1245	0.0000	409.3445
Total	**0.4111**	**4.8306**	**2.6021**	**4.3800e-003**	**0.7392**	**0.2178**	**0.9570**	**0.3458**	**0.2004**	**0.5462**	**0.0000**	**406.2328**	**406.2328**	**0.1245**	**0.0000**	**409.3445**

3.4 Grading - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.7900e-003	6.5100e-003	0.0647	1.3000e-004	0.0120	1.0000e-004	0.0121	3.1900e-003	9.0000e-005	3.2800e-003	0.0000	11.7586	11.7586	4.6000e-004	0.0000	11.7702
Total	**8.7900e-003**	**6.5100e-003**	**0.0647**	**1.3000e-004**	**0.0120**	**1.0000e-004**	**0.0121**	**3.1900e-003**	**9.0000e-005**	**3.2800e-003**	**0.0000**	**11.7586**	**11.7586**	**4.6000e-004**	**0.0000**	**11.7702**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2883	0.0000	0.2883	0.1349	0.0000	0.1349	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.4111	4.8306	2.6021	4.3800e-003		0.2178	0.2178		0.2004	0.2004	0.0000	406.2323	406.2323	0.1245	0.0000	409.3440
Total	**0.4111**	**4.8306**	**2.6021**	**4.3800e-003**	**0.2883**	**0.2178**	**0.5061**	**0.1349**	**0.2004**	**0.3353**	**0.0000**	**406.2323**	**406.2323**	**0.1245**	**0.0000**	**409.3440**

3.4 Grading - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.7900e-003	6.5100e-003	0.0647	1.3000e-004	0.0120	1.0000e-004	0.0121	3.1900e-003	9.0000e-005	3.2800e-003	0.0000	11.7586	11.7586	4.6000e-004	0.0000	11.7702
Total	**8.7900e-003**	**6.5100e-003**	**0.0647**	**1.3000e-004**	**0.0120**	**1.0000e-004**	**0.0121**	**3.1900e-003**	**9.0000e-005**	**3.2800e-003**	**0.0000**	**11.7586**	**11.7586**	**4.6000e-004**	**0.0000**	**11.7702**

3.5 Paving - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0540	0.5555	0.6301	9.8000e-004		0.0291	0.0291		0.0268	0.0268	0.0000	86.1010	86.1010	0.0279	0.0000	86.7971
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0540**	**0.5555**	**0.6301**	**9.8000e-004**		**0.0291**	**0.0291**		**0.0268**	**0.0268**	**0.0000**	**86.1010**	**86.1010**	**0.0279**	**0.0000**	**86.7971**

3.5 Paving - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.5100e-003	1.6500e-003	0.0171	5.0000e-005	5.1600e-003	4.0000e-005	5.1900e-003	1.3700e-003	3.0000e-005	1.4000e-003	0.0000	4.4697	4.4697	1.2000e-004	0.0000	4.4726
Total	**2.5100e-003**	**1.6500e-003**	**0.0171**	**5.0000e-005**	**5.1600e-003**	**4.0000e-005**	**5.1900e-003**	**1.3700e-003**	**3.0000e-005**	**1.4000e-003**	**0.0000**	**4.4697**	**4.4697**	**1.2000e-004**	**0.0000**	**4.4726**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0540	0.5555	0.6301	9.8000e-004		0.0291	0.0291		0.0268	0.0268	0.0000	86.1009	86.1009	0.0279	0.0000	86.7970
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0540**	**0.5555**	**0.6301**	**9.8000e-004**		**0.0291**	**0.0291**		**0.0268**	**0.0268**	**0.0000**	**86.1009**	**86.1009**	**0.0279**	**0.0000**	**86.7970**

3.5 Paving - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.5100e-003	1.6500e-003	0.0171	5.0000e-005	5.1600e-003	4.0000e-005	5.1900e-003	1.3700e-003	3.0000e-005	1.4000e-003	0.0000	4.4697	4.4697	1.2000e-004	0.0000	4.4726
Total	**2.5100e-003**	**1.6500e-003**	**0.0171**	**5.0000e-005**	**5.1600e-003**	**4.0000e-005**	**5.1900e-003**	**1.3700e-003**	**3.0000e-005**	**1.4000e-003**	**0.0000**	**4.4697**	**4.4697**	**1.2000e-004**	**0.0000**	**4.4726**

3.6 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0532	0.4384	0.3361	5.3000e-004		0.0307	0.0307		0.0295	0.0295	0.0000	46.2515	46.2515	7.6900e-003	0.0000	46.4438
Total	**0.0532**	**0.4384**	**0.3361**	**5.3000e-004**		**0.0307**	**0.0307**		**0.0295**	**0.0295**	**0.0000**	**46.2515**	**46.2515**	**7.6900e-003**	**0.0000**	**46.4438**

3.6 Building Construction - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0138	0.3262	0.0752	6.3000e-004	0.0144	3.1800e-003	0.0176	4.1700e-003	3.0400e-003	7.2100e-003	0.0000	59.9611	59.9611	5.4800e-003	0.0000	60.0981
Worker	0.0466	0.0345	0.3427	6.9000e-004	0.0636	5.1000e-004	0.0641	0.0169	4.7000e-004	0.0174	0.0000	62.3207	62.3207	2.4600e-003	0.0000	62.3821
Total	**0.0604**	**0.3607**	**0.4179**	**1.3200e-003**	**0.0780**	**3.6900e-003**	**0.0817**	**0.0211**	**3.5100e-003**	**0.0246**	**0.0000**	**122.2818**	**122.2818**	**7.9400e-003**	**0.0000**	**122.4802**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0532	0.4384	0.3361	5.3000e-004		0.0307	0.0307		0.0295	0.0295	0.0000	46.2514	46.2514	7.6900e-003	0.0000	46.4437
Total	**0.0532**	**0.4384**	**0.3361**	**5.3000e-004**		**0.0307**	**0.0307**		**0.0295**	**0.0295**	**0.0000**	**46.2514**	**46.2514**	**7.6900e-003**	**0.0000**	**46.4437**

3.6 Building Construction - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0138	0.3262	0.0752	6.3000e-004	0.0144	3.1800e-003	0.0176	4.1700e-003	3.0400e-003	7.2100e-003	0.0000	59.9611	59.9611	5.4800e-003	0.0000	60.0981
Worker	0.0466	0.0345	0.3427	6.9000e-004	0.0636	5.1000e-004	0.0641	0.0169	4.7000e-004	0.0174	0.0000	62.3207	62.3207	2.4600e-003	0.0000	62.3821
Total	**0.0604**	**0.3607**	**0.4179**	**1.3200e-003**	**0.0780**	**3.6900e-003**	**0.0817**	**0.0211**	**3.5100e-003**	**0.0246**	**0.0000**	**122.2818**	**122.2818**	**7.9400e-003**	**0.0000**	**122.4802**

3.6 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4830	4.0990	3.4429	5.4900e-003		0.2728	0.2728		0.2626	0.2626	0.0000	479.9793	479.9793	0.0774	0.0000	481.9141
Total	**0.4830**	**4.0990**	**3.4429**	**5.4900e-003**		**0.2728**	**0.2728**		**0.2626**	**0.2626**	**0.0000**	**479.9793**	**479.9793**	**0.0774**	**0.0000**	**481.9141**

3.6 Building Construction - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1247	3.2031	0.6842	6.5700e-003	0.1505	0.0270	0.1775	0.0435	0.0258	0.0693	0.0000	623.5869	623.5869	0.0533	0.0000	624.9181
Worker	0.4296	0.3107	3.0964	7.0200e-003	0.6636	5.0500e-003	0.6686	0.1764	4.6500e-003	0.1810	0.0000	633.5794	633.5794	0.0224	0.0000	634.1396
Total	**0.5542**	**3.5139**	**3.7805**	**0.0136**	**0.8141**	**0.0320**	**0.8461**	**0.2198**	**0.0304**	**0.2503**	**0.0000**	**1,257.1662**	**1,257.1662**	**0.0757**	**0.0000**	**1,259.0577**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4830	4.0990	3.4429	5.4900e-003		0.2728	0.2728		0.2626	0.2626	0.0000	479.9787	479.9787	0.0774	0.0000	481.9136
Total	**0.4830**	**4.0990**	**3.4429**	**5.4900e-003**		**0.2728**	**0.2728**		**0.2626**	**0.2626**	**0.0000**	**479.9787**	**479.9787**	**0.0774**	**0.0000**	**481.9136**

3.6 Building Construction - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1247	3.2031	0.6842	6.5700e-003	0.1505	0.0270	0.1775	0.0435	0.0258	0.0693	0.0000	623.5869	623.5869	0.0533	0.0000	624.9181
Worker	0.4296	0.3107	3.0964	7.0200e-003	0.6636	5.0500e-003	0.6686	0.1764	4.6500e-003	0.1810	0.0000	633.5794	633.5794	0.0224	0.0000	634.1396
Total	**0.5542**	**3.5139**	**3.7805**	**0.0136**	**0.8141**	**0.0320**	**0.8461**	**0.2198**	**0.0304**	**0.2503**	**0.0000**	**1,257.1662**	**1,257.1662**	**0.0757**	**0.0000**	**1,259.0577**

3.6 Building Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4258	3.7277	3.3980	5.4900e-003		0.2353	0.2353		0.2265	0.2265	0.0000	477.1549	477.1549	0.0745	0.0000	479.0168
Total	**0.4258**	**3.7277**	**3.3980**	**5.4900e-003**		**0.2353**	**0.2353**		**0.2265**	**0.2265**	**0.0000**	**477.1549**	**477.1549**	**0.0745**	**0.0000**	**479.0168**

3.6 Building Construction - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1109	3.0283	0.6084	6.5100e-003	0.1505	0.0229	0.1734	0.0435	0.0219	0.0654	0.0000	618.3685	618.3685	0.0516	0.0000	619.6584
Worker	0.3859	0.2710	2.7238	6.8100e-003	0.6636	4.8900e-003	0.6684	0.1764	4.5000e-003	0.1809	0.0000	614.8987	614.8987	0.0197	0.0000	615.3902
Total	**0.4968**	**3.2992**	**3.3322**	**0.0133**	**0.8141**	**0.0278**	**0.8418**	**0.2199**	**0.0264**	**0.2462**	**0.0000**	**1,233.2672**	**1,233.2672**	**0.0713**	**0.0000**	**1,235.0486**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4258	3.7276	3.3980	5.4900e-003		0.2353	0.2353		0.2265	0.2265	0.0000	477.1544	477.1544	0.0745	0.0000	479.0163
Total	**0.4258**	**3.7276**	**3.3980**	**5.4900e-003**		**0.2353**	**0.2353**		**0.2265**	**0.2265**	**0.0000**	**477.1544**	**477.1544**	**0.0745**	**0.0000**	**479.0163**

3.6 Building Construction - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1109	3.0283	0.6084	6.5100e-003	0.1505	0.0229	0.1734	0.0435	0.0219	0.0654	0.0000	618.3685	618.3685	0.0516	0.0000	619.6584
Worker	0.3859	0.2710	2.7238	6.8100e-003	0.6636	4.8900e-003	0.6684	0.1764	4.5000e-003	0.1809	0.0000	614.8987	614.8987	0.0197	0.0000	615.3902
Total	**0.4968**	**3.2992**	**3.3322**	**0.0133**	**0.8141**	**0.0278**	**0.8418**	**0.2199**	**0.0264**	**0.2462**	**0.0000**	**1,233.2672**	**1,233.2672**	**0.0713**	**0.0000**	**1,235.0486**

3.6 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3841	3.4220	3.3771	5.5100e-003		0.2050	0.2050		0.1973	0.1973	0.0000	475.2559	475.2559	0.0724	0.0000	477.0667
Total	**0.3841**	**3.4220**	**3.3771**	**5.5100e-003**		**0.2050**	**0.2050**		**0.1973**	**0.1973**	**0.0000**	**475.2559**	**475.2559**	**0.0724**	**0.0000**	**477.0667**

3.6 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0903	2.7746	0.5262	6.4800e-003	0.1511	0.0153	0.1664	0.0437	0.0146	0.0583	0.0000	615.4830	615.4830	0.0486	0.0000	616.6979
Worker	0.3522	0.2391	2.4295	6.6200e-003	0.6661	4.7500e-003	0.6708	0.1770	4.3700e-003	0.1814	0.0000	598.1513	598.1513	0.0171	0.0000	598.5797
Total	**0.4425**	**3.0137**	**2.9557**	**0.0131**	**0.8172**	**0.0200**	**0.8372**	**0.2207**	**0.0190**	**0.2397**	**0.0000**	**1,213.6343**	**1,213.6343**	**0.0657**	**0.0000**	**1,215.2776**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3841	3.4220	3.3771	5.5100e-003		0.2050	0.2050		0.1973	0.1973	0.0000	475.2553	475.2553	0.0724	0.0000	477.0661
Total	**0.3841**	**3.4220**	**3.3771**	**5.5100e-003**		**0.2050**	**0.2050**		**0.1973**	**0.1973**	**0.0000**	**475.2553**	**475.2553**	**0.0724**	**0.0000**	**477.0661**

3.6 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0903	2.7746	0.5262	6.4800e-003	0.1511	0.0153	0.1664	0.0437	0.0146	0.0583	0.0000	615.4830	615.4830	0.0486	0.0000	616.6979
Worker	0.3522	0.2391	2.4295	6.6200e-003	0.6661	4.7500e-003	0.6708	0.1770	4.3700e-003	0.1814	0.0000	598.1513	598.1513	0.0171	0.0000	598.5797
Total	**0.4425**	**3.0137**	**2.9557**	**0.0131**	**0.8172**	**0.0200**	**0.8372**	**0.2207**	**0.0190**	**0.2397**	**0.0000**	**1,213.6343**	**1,213.6343**	**0.0657**	**0.0000**	**1,215.2776**

3.6 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1458	1.3179	1.4171	2.3400e-003		0.0744	0.0744		0.0716	0.0716	0.0000	201.3612	201.3612	0.0299	0.0000	202.1096
Total	**0.1458**	**1.3179**	**1.4171**	**2.3400e-003**		**0.0744**	**0.0744**		**0.0716**	**0.0716**	**0.0000**	**201.3612**	**201.3612**	**0.0299**	**0.0000**	**202.1096**

3.6 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0311	1.0648	0.1943	2.7200e-003	0.0640	3.0000e-003	0.0670	0.0185	2.8700e-003	0.0214	0.0000	258.3355	258.3355	0.0197	0.0000	258.8286
Worker	0.1375	0.0900	0.9336	2.7100e-003	0.2822	1.9400e-003	0.2841	0.0750	1.7900e-003	0.0768	0.0000	244.6059	244.6059	6.4600e-003	0.0000	244.7675
Total	**0.1686**	**1.1548**	**1.1279**	**5.4300e-003**	**0.3462**	**4.9400e-003**	**0.3512**	**0.0935**	**4.6600e-003**	**0.0982**	**0.0000**	**502.9413**	**502.9413**	**0.0262**	**0.0000**	**503.5961**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1458	1.3179	1.4171	2.3400e-003		0.0744	0.0744		0.0716	0.0716	0.0000	201.3609	201.3609	0.0299	0.0000	202.1093
Total	**0.1458**	**1.3179**	**1.4171**	**2.3400e-003**		**0.0744**	**0.0744**		**0.0716**	**0.0716**	**0.0000**	**201.3609**	**201.3609**	**0.0299**	**0.0000**	**202.1093**

3.6 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0311	1.0648	0.1943	2.7200e-003	0.0640	3.0000e-003	0.0670	0.0185	2.8700e-003	0.0214	0.0000	258.3355	258.3355	0.0197	0.0000	258.8286
Worker	0.1375	0.0900	0.9336	2.7100e-003	0.2822	1.9400e-003	0.2841	0.0750	1.7900e-003	0.0768	0.0000	244.6059	244.6059	6.4600e-003	0.0000	244.7675
Total	**0.1686**	**1.1548**	**1.1279**	**5.4300e-003**	**0.3462**	**4.9400e-003**	**0.3512**	**0.0935**	**4.6600e-003**	**0.0982**	**0.0000**	**502.9413**	**502.9413**	**0.0262**	**0.0000**	**503.5961**

3.7 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.4503					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.0000e-003	0.0489	0.0582	1.0000e-004		3.0100e-003	3.0100e-003		3.0100e-003	3.0100e-003	0.0000	8.1704	8.1704	5.6000e-004	0.0000	8.1844
Total	**1.4573**	**0.0489**	**0.0582**	**1.0000e-004**		**3.0100e-003**	**3.0100e-003**		**3.0100e-003**	**3.0100e-003**	**0.0000**	**8.1704**	**8.1704**	**5.6000e-004**	**0.0000**	**8.1844**

3.7 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0158	0.0104	0.1075	3.1000e-004	0.0325	2.2000e-004	0.0327	8.6400e-003	2.1000e-004	8.8400e-003	0.0000	28.1625	28.1625	7.4000e-004	0.0000	28.1811
Total	**0.0158**	**0.0104**	**0.1075**	**3.1000e-004**	**0.0325**	**2.2000e-004**	**0.0327**	**8.6400e-003**	**2.1000e-004**	**8.8400e-003**	**0.0000**	**28.1625**	**28.1625**	**7.4000e-004**	**0.0000**	**28.1811**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.4503					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.0000e-003	0.0489	0.0582	1.0000e-004		3.0100e-003	3.0100e-003		3.0100e-003	3.0100e-003	0.0000	8.1704	8.1704	5.6000e-004	0.0000	8.1844
Total	**1.4573**	**0.0489**	**0.0582**	**1.0000e-004**		**3.0100e-003**	**3.0100e-003**		**3.0100e-003**	**3.0100e-003**	**0.0000**	**8.1704**	**8.1704**	**5.6000e-004**	**0.0000**	**8.1844**

3.7 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0158	0.0104	0.1075	3.1000e-004	0.0325	2.2000e-004	0.0327	8.6400e-003	2.1000e-004	8.8400e-003	0.0000	28.1625	28.1625	7.4000e-004	0.0000	28.1811
Total	**0.0158**	**0.0104**	**0.1075**	**3.1000e-004**	**0.0325**	**2.2000e-004**	**0.0327**	**8.6400e-003**	**2.1000e-004**	**8.8400e-003**	**0.0000**	**28.1625**	**28.1625**	**7.4000e-004**	**0.0000**	**28.1811**

3.7 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.8917					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0266	0.1831	0.2358	3.9000e-004		0.0106	0.0106		0.0106	0.0106	0.0000	33.1923	33.1923	2.1600e-003	0.0000	33.2463
Total	**5.9183**	**0.1831**	**0.2358**	**3.9000e-004**		**0.0106**	**0.0106**		**0.0106**	**0.0106**	**0.0000**	**33.1923**	**33.1923**	**2.1600e-003**	**0.0000**	**33.2463**

3.7 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0596	0.0376	0.3979	1.2200e-003	0.1320	8.8000e-004	0.1329	0.0351	8.1000e-004	0.0359	0.0000	110.3214	110.3214	2.7000e-003	0.0000	110.3888
Total	**0.0596**	**0.0376**	**0.3979**	**1.2200e-003**	**0.1320**	**8.8000e-004**	**0.1329**	**0.0351**	**8.1000e-004**	**0.0359**	**0.0000**	**110.3214**	**110.3214**	**2.7000e-003**	**0.0000**	**110.3888**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.8917					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0266	0.1831	0.2358	3.9000e-004		0.0106	0.0106		0.0106	0.0106	0.0000	33.1923	33.1923	2.1600e-003	0.0000	33.2463
Total	**5.9183**	**0.1831**	**0.2358**	**3.9000e-004**		**0.0106**	**0.0106**		**0.0106**	**0.0106**	**0.0000**	**33.1923**	**33.1923**	**2.1600e-003**	**0.0000**	**33.2463**

3.7 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0596	0.0376	0.3979	1.2200e-003	0.1320	8.8000e-004	0.1329	0.0351	8.1000e-004	0.0359	0.0000	110.3214	110.3214	2.7000e-003	0.0000	110.3888
Total	**0.0596**	**0.0376**	**0.3979**	**1.2200e-003**	**0.1320**	**8.8000e-004**	**0.1329**	**0.0351**	**8.1000e-004**	**0.0359**	**0.0000**	**110.3214**	**110.3214**	**2.7000e-003**	**0.0000**	**110.3888**

3.7 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.8917					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0249	0.1694	0.2355	3.9000e-004		9.2100e-003	9.2100e-003		9.2100e-003	9.2100e-003	0.0000	33.1923	33.1923	1.9900e-003	0.0000	33.2419
Total	**5.9167**	**0.1694**	**0.2355**	**3.9000e-004**		**9.2100e-003**	**9.2100e-003**		**9.2100e-003**	**9.2100e-003**	**0.0000**	**33.1923**	**33.1923**	**1.9900e-003**	**0.0000**	**33.2419**

3.7 Architectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0553	0.0336	0.3625	1.1700e-003	0.1320	8.6000e-004	0.1329	0.0351	7.9000e-004	0.0359	0.0000	106.2072	106.2072	2.4000e-003	0.0000	106.2673
Total	**0.0553**	**0.0336**	**0.3625**	**1.1700e-003**	**0.1320**	**8.6000e-004**	**0.1329**	**0.0351**	**7.9000e-004**	**0.0359**	**0.0000**	**106.2072**	**106.2072**	**2.4000e-003**	**0.0000**	**106.2673**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.8917					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0249	0.1694	0.2354	3.9000e-004		9.2100e-003	9.2100e-003		9.2100e-003	9.2100e-003	0.0000	33.1923	33.1923	1.9900e-003	0.0000	33.2419
Total	**5.9167**	**0.1694**	**0.2354**	**3.9000e-004**		**9.2100e-003**	**9.2100e-003**		**9.2100e-003**	**9.2100e-003**	**0.0000**	**33.1923**	**33.1923**	**1.9900e-003**	**0.0000**	**33.2419**

3.7 Architectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0553	0.0336	0.3625	1.1700e-003	0.1320	8.6000e-004	0.1329	0.0351	7.9000e-004	0.0359	0.0000	106.2072	106.2072	2.4000e-003	0.0000	106.2673
Total	**0.0553**	**0.0336**	**0.3625**	**1.1700e-003**	**0.1320**	**8.6000e-004**	**0.1329**	**0.0351**	**7.9000e-004**	**0.0359**	**0.0000**	**106.2072**	**106.2072**	**2.4000e-003**	**0.0000**	**106.2673**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.9371					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0237	0.1597	0.2371	3.9000e-004		7.9800e-003	7.9800e-003		7.9800e-003	7.9800e-003	0.0000	33.4476	33.4476	1.8800e-003	0.0000	33.4947
Total	**5.9607**	**0.1597**	**0.2371**	**3.9000e-004**		**7.9800e-003**	**7.9800e-003**		**7.9800e-003**	**7.9800e-003**	**0.0000**	**33.4476**	**33.4476**	**1.8800e-003**	**0.0000**	**33.4947**

3.7 Architectural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0520	0.0305	0.3371	1.1400e-003	0.1330	8.4000e-004	0.1339	0.0354	7.8000e-004	0.0361	0.0000	102.9555	102.9555	2.1800e-003	0.0000	103.0100
Total	**0.0520**	**0.0305**	**0.3371**	**1.1400e-003**	**0.1330**	**8.4000e-004**	**0.1339**	**0.0354**	**7.8000e-004**	**0.0361**	**0.0000**	**102.9555**	**102.9555**	**2.1800e-003**	**0.0000**	**103.0100**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.9371					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0237	0.1597	0.2371	3.9000e-004		7.9800e-003	7.9800e-003		7.9800e-003	7.9800e-003	0.0000	33.4476	33.4476	1.8800e-003	0.0000	33.4947
Total	**5.9607**	**0.1597**	**0.2371**	**3.9000e-004**		**7.9800e-003**	**7.9800e-003**		**7.9800e-003**	**7.9800e-003**	**0.0000**	**33.4476**	**33.4476**	**1.8800e-003**	**0.0000**	**33.4947**

3.7 Architectural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0520	0.0305	0.3371	1.1400e-003	0.1330	8.4000e-004	0.1339	0.0354	7.8000e-004	0.0361	0.0000	102.9555	102.9555	2.1800e-003	0.0000	103.0100
Total	**0.0520**	**0.0305**	**0.3371**	**1.1400e-003**	**0.1330**	**8.4000e-004**	**0.1339**	**0.0354**	**7.8000e-004**	**0.0361**	**0.0000**	**102.9555**	**102.9555**	**2.1800e-003**	**0.0000**	**103.0100**

3.7 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.6769					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.3200e-003	0.0424	0.0669	1.1000e-004		1.9100e-003	1.9100e-003		1.9100e-003	1.9100e-003	0.0000	9.4470	9.4470	5.2000e-004	0.0000	9.4599
Total	**1.6832**	**0.0424**	**0.0669**	**1.1000e-004**		**1.9100e-003**	**1.9100e-003**		**1.9100e-003**	**1.9100e-003**	**0.0000**	**9.4470**	**9.4470**	**5.2000e-004**	**0.0000**	**9.4599**

3.7 Architectural Coating - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0138	7.7800e-003	0.0877	3.1000e-004	0.0376	2.3000e-004	0.0378	9.9900e-003	2.1000e-004	0.0102	0.0000	27.9301	27.9301	5.5000e-004	0.0000	27.9440
Total	**0.0138**	**7.7800e-003**	**0.0877**	**3.1000e-004**	**0.0376**	**2.3000e-004**	**0.0378**	**9.9900e-003**	**2.1000e-004**	**0.0102**	**0.0000**	**27.9301**	**27.9301**	**5.5000e-004**	**0.0000**	**27.9440**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.6769					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.3200e-003	0.0424	0.0669	1.1000e-004		1.9100e-003	1.9100e-003		1.9100e-003	1.9100e-003	0.0000	9.4470	9.4470	5.2000e-004	0.0000	9.4599
Total	**1.6832**	**0.0424**	**0.0669**	**1.1000e-004**		**1.9100e-003**	**1.9100e-003**		**1.9100e-003**	**1.9100e-003**	**0.0000**	**9.4470**	**9.4470**	**5.2000e-004**	**0.0000**	**9.4599**

3.7 Architectural Coating - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0138	7.7800e-003	0.0877	3.1000e-004	0.0376	2.3000e-004	0.0378	9.9900e-003	2.1000e-004	0.0102	0.0000	27.9301	27.9301	5.5000e-004	0.0000	27.9440
Total	**0.0138**	**7.7800e-003**	**0.0877**	**3.1000e-004**	**0.0376**	**2.3000e-004**	**0.0378**	**9.9900e-003**	**2.1000e-004**	**0.0102**	**0.0000**	**27.9301**	**27.9301**	**5.5000e-004**	**0.0000**	**27.9440**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Density

Improve Walkability Design

Improve Destination Accessibility

Increase Transit Accessibility

Improve Pedestrian Network

Provide Traffic Calming Measures

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	35.6104	213.1243	332.6333	1.4974	16.5533	4.8804	21.4337	4.4621	4.6600	9.1221	0.0000	30,433.2351	30,433.2351	7.4196	0.0000	30,618.7252
Unmitigated	37.2315	227.5222	356.6393	1.6168	18.3416	5.2907	23.6323	4.9442	5.0517	9.9959	0.0000	33,231.1926	33,231.1926	7.6492	0.0000	33,422.4227

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Low Rise	1,847.30	2,076.40	1760.30	5,411,963	4,884,296
Regional Shopping Center	9,730.03	11,884.86	6003.08	16,665,943	15,041,014
Single Family Housing	8,892.00	9,662.25	8404.50	25,884,438	23,360,705
Total	20,469.33	23,623.51	16,167.88	47,962,344	43,286,015

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Low Rise	10.80	7.30	7.50	45.60	19.00	35.40	86	11	3
Regional Shopping Center	9.50	7.30	7.30	16.30	64.70	19.00	54	35	11
Single Family Housing	10.80	7.30	7.50	45.60	19.00	35.40	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Low Rise	0.419110	0.063099	0.152111	0.182171	0.043370	0.007308	0.023041	0.098286	0.001486	0.001644	0.005352	0.001034	0.001989
Single Family Housing	0.419110	0.063099	0.152111	0.182171	0.043370	0.007308	0.023041	0.098286	0.001486	0.001644	0.005352	0.001034	0.001989
Regional Shopping Center	0.419110	0.063099	0.152111	0.182171	0.043370	0.007308	0.023041	0.098286	0.001486	0.001644	0.005352	0.001034	0.001989

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

Install High Efficiency Lighting

Install Energy Efficient Appliances

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	3,525.9809	3,525.9809	0.1594	0.0330	3,539.7967
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	3,816.8164	3,816.8164	0.1726	0.0357	3,831.7719
NaturalGas Mitigated	0.1802	1.5469	0.7068	9.8300e-003		0.1245	0.1245		0.1245	0.1245	0.0000	1,783.3197	1,783.3197	0.0342	0.0327	1,793.9171
NaturalGas Unmitigated	0.2087	1.7915	0.8191	0.0114		0.1442	0.1442		0.1442	0.1442	0.0000	2,065.2075	2,065.2075	0.0396	0.0379	2,077.4800

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Low Rise	4.71776e+006	0.0254	0.2174	0.0925	1.3900e-003		0.0176	0.0176		0.0176	0.0176	0.0000	251.7575	251.7575	4.8300e-003	4.6200e-003	253.2536
Regional Shopping Center	2.7946e+006	0.0151	0.1370	0.1151	8.2000e-004		0.0104	0.0104		0.0104	0.0104	0.0000	149.1303	149.1303	2.8600e-003	2.7300e-003	150.0165
Single Family Housing	3.11882e+007	0.1682	1.4371	0.6115	9.1700e-003		0.1162	0.1162		0.1162	0.1162	0.0000	1,664.3197	1,664.3197	0.0319	0.0305	1,674.2099
Total		**0.2087**	**1.7915**	**0.8191**	**0.0114**		**0.1442**	**0.1442**		**0.1442**	**0.1442**	**0.0000**	**2,065.2075**	**2,065.2075**	**0.0396**	**0.0379**	**2,077.4800**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Low Rise	4.12698e+006	0.0223	0.1902	0.0809	1.2100e-003		0.0154	0.0154		0.0154	0.0154	0.0000	220.2313	220.2313	4.2200e-003	4.0400e-003	221.5400
Regional Shopping Center	2.38825e+006	0.0129	0.1171	0.0983	7.0000e-004		8.9000e-003	8.9000e-003		8.9000e-003	8.9000e-003	0.0000	127.4461	127.4461	2.4400e-003	2.3400e-003	128.2035
Single Family Housing	2.69029e+007	0.1451	1.2396	0.5275	7.9100e-003		0.1002	0.1002		0.1002	0.1002	0.0000	1,435.6423	1,435.6423	0.0275	0.0263	1,444.1736
Total		**0.1802**	**1.5469**	**0.7068**	**9.8200e-003**		**0.1245**	**0.1245**		**0.1245**	**0.1245**	**0.0000**	**1,783.3197**	**1,783.3197**	**0.0342**	**0.0327**	**1,793.9171**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Low Rise	1.40112e+006	407.6020	0.0184	3.8100e-003	409.1991
Regional Shopping Center	2.88735e+006	839.9642	0.0380	7.8600e-003	843.2554
Single Family Housing	8.83173e+006	2,569.2502	0.1162	0.0240	2,579.3173
Total		**3,816.8164**	**0.1726**	**0.0357**	**3,831.7719**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Low Rise	1.30565e+006	379.8287	0.0172	3.5500e-003	381.3170
Regional Shopping Center	2.51043e+006	730.3122	0.0330	6.8300e-003	733.1738
Single Family Housing	8.30438e+006	2,415.8400	0.1092	0.0226	2,425.3060
Total		**3,525.9809**	**0.1594**	**0.0330**	**3,539.7967**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

Use Low VOC Paint - Non-Residential Interior

Use Low VOC Paint - Non-Residential Exterior

Use only Natural Gas Hearths

Use Low VOC Cleaning Supplies

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	10.8608	0.6213	11.0975	3.5200e-003		0.0843	0.0843		0.0843	0.0843	0.0000	563.3545	563.3545	0.0351	0.0101	567.2258
Unmitigated	11.5274	0.6213	11.0975	3.5200e-003		0.0843	0.0843		0.0843	0.0843	0.0000	563.3545	563.3545	0.0351	0.0101	567.2258

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.0848					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	8.9156					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0554	0.4732	0.2014	3.0200e-003		0.0383	0.0383		0.0383	0.0383	0.0000	548.0074	548.0074	0.0105	0.0101	551.2639
Landscaping	0.4716	0.1481	10.8962	5.0000e-004		0.0460	0.0460		0.0460	0.0460	0.0000	15.3472	15.3472	0.0246	0.0000	15.9619
Total	**11.5274**	**0.6213**	**11.0976**	**3.5200e-003**		**0.0843**	**0.0843**		**0.0843**	**0.0843**	**0.0000**	**563.3545**	**563.3545**	**0.0351**	**0.0101**	**567.2258**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.0848					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	8.2490					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0554	0.4732	0.2014	3.0200e-003		0.0383	0.0383		0.0383	0.0383	0.0000	548.0074	548.0074	0.0105	0.0101	551.2639
Landscaping	0.4716	0.1481	10.8962	5.0000e-004		0.0460	0.0460		0.0460	0.0460	0.0000	15.3472	15.3472	0.0246	0.0000	15.9619
Total	**10.8608**	**0.6213**	**11.0976**	**3.5200e-003**		**0.0843**	**0.0843**		**0.0843**	**0.0843**	**0.0000**	**563.3545**	**563.3545**	**0.0351**	**0.0101**	**567.2258**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	211.3682	2.6162	0.0633	295.6407
Unmitigated	253.1077	3.2697	0.0790	358.4047

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Low Rise	18.8947 / 11.9119	47.8655	0.6176	0.0149	67.7538
Regional Shopping Center	17.6174 / 10.7978	44.3153	0.5758	0.0139	62.8580
Single Family Housing	63.5252 / 40.0485	160.9270	2.0763	0.0502	227.7929
Total		**253.1077**	**3.2697**	**0.0790**	**358.4047**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Low Rise	15.1157 / 11.1852	39.9782	0.4941	0.0120	55.8955
Regional Shopping Center	14.0939 / 10.1391	36.9805	0.4607	0.0112	51.8206
Single Family Housing	50.8201 / 37.6055	134.4096	1.6613	0.0402	187.9246
Total		**211.3682**	**2.6162**	**0.0633**	**295.6407**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	310.8685	18.3718	0.0000	770.1635
Unmitigated	310.8685	18.3718	0.0000	770.1635

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Low Rise	133.4	27.0790	1.6003	0.0000	67.0871
Regional Shopping Center	249.73	50.6929	2.9959	0.0000	125.5896
Single Family Housing	1148.31	233.0966	13.7756	0.0000	577.4868
Total		**310.8685**	**18.3718**	**0.0000**	**770.1635**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Low Rise	133.4	27.0790	1.6003	0.0000	67.0871
Regional Shopping Center	249.73	50.6929	2.9959	0.0000	125.5896
Single Family Housing	1148.31	233.0966	13.7756	0.0000	577.4868
Total		**310.8685**	**18.3718**	**0.0000**	**770.1635**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

	Total CO2	CH4	N2O	CO2e
Category	MT			
Unmitigated	-1,474.9800	0.0000	0.0000	-1,474.9800

11.1 Vegetation Land Change

Vegetation Type

	Initial/Final	Total CO2	CH4	N2O	CO2e
	Acres	MT			
Cropland	237.9 / 0	-1,474.9800	0.0000	0.0000	-1,474.9800
Total		**-1,474.9800**	**0.0000**	**0.0000**	**-1,474.9800**

Oakwood Landing

San Joaquin Valley Unified APCD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Low Rise	290.00	Dwelling Unit	11.59	290,000.00	908
Single Family Housing	975.00	Dwelling Unit	226.93	1,755,000.00	3052
Regional Shopping Center	237.84	1000sqft	13.00	237,838.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	45
Climate Zone	2			**Operational Year**	2020
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - See assumptions in Appendix B

Land Use - See assumptions in Appendix B

Construction Phase - See assumptions in Appendix B

Off-road Equipment - See assumptions in Appendix B

Off-road Equipment - See assumptions in Appendix B4

Off-road Equipment - See assumptions in Appendix B

Off-road Equipment - See assumptions in Appendix B

Off-road Equipment -

Off-road Equipment -

Demolition - See assumptions in Appendix B

Grading - See assumptions in Appendix B

Vehicle Trips - See assumptions in Appendix B

Land Use Change - See assumptions in Appendix B

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Area Mitigation -

Energy Mitigation -

Water Mitigation -

Table Name	Column Name	Default Value	New Value
tblAreaMitigation	UseLowVOCPaintParkingCheck	False	True
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	5
tblConstructionPhase	NumDays	330.00	920.00
tblConstructionPhase	NumDays	4,650.00	920.00
tblConstructionPhase	NumDays	300.00	1.00
tblConstructionPhase	NumDays	465.00	100.00

Oakwood Landing - San Joaquin Valley Unified APCD Air District, Annual

tblConstructionPhase	NumDays	330.00	86.00
tblConstructionPhase	NumDays	180.00	26.00
tblGrading	AcresOfGrading	300.00	258.29
tblGrading	AcresOfGrading	0.00	258.29
tblLandUse	BuildingSpaceSquareFeet	237,840.00	237,838.00
tblLandUse	LandUseSquareFeet	237,840.00	237,838.00
tblLandUse	LotAcreage	18.13	11.59
tblLandUse	LotAcreage	316.56	226.93
tblLandUse	LotAcreage	5.46	13.00
tblLandUse	Population	920.00	908.00
tblLandUse	Population	3,093.00	3,052.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	UsageHours	7.00	3.00
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblProjectCharacteristics	OperationalYear	2018	2020
tblVehicleTrips	WD_TR	6.59	6.37
tblVehicleTrips	WD_TR	42.70	40.91
tblVehicleTrips	WD_TR	9.52	9.12
tblWoodstoves	NumberCatalytic	11.59	0.00

tblWoodstoves	NumberCatalytic	226.93	0.00
tblWoodstoves	NumberNoncatalytic	11.59	0.00
tblWoodstoves	NumberNoncatalytic	226.93	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.6005	6.3282	3.7419	6.8800e-003	1.2033	0.2903	1.4936	0.5145	0.2685	0.7830	0.0000	635.3864	635.3864	0.1549	0.0000	639.2600
2018	1.0372	7.6128	7.2234	0.0191	0.8141	0.3048	1.1189	0.2199	0.2930	0.5128	0.0000	1,737.1455	1,737.1455	0.1531	0.0000	1,740.9718
2019	0.9226	7.0269	6.7301	0.0188	0.8141	0.2631	1.0772	0.2199	0.2529	0.4727	0.0000	1,710.4221	1,710.4221	0.1457	0.0000	1,714.0655
2020	0.8266	6.4357	6.3328	0.0186	0.8172	0.2250	1.0422	0.2207	0.2163	0.4369	0.0000	1,688.8902	1,688.8902	0.1382	0.0000	1,692.3443
2021	1.8440	3.0891	3.3578	9.2000e-003	0.3839	0.1117	0.4956	0.1035	0.1063	0.2098	0.0000	831.2060	831.2060	0.0854	0.0000	833.3409
2022	5.9779	0.2207	0.6337	1.6100e-003	0.1320	0.0115	0.1435	0.0351	0.0114	0.0465	0.0000	143.5137	143.5137	4.8600e-003	0.0000	143.6351
2023	5.9720	0.2030	0.5980	1.5600e-003	0.1320	0.0101	0.1421	0.0351	9.9900e-003	0.0451	0.0000	139.3995	139.3995	4.3900e-003	0.0000	139.5092
2024	6.0128	0.1901	0.5742	1.5300e-003	0.1330	8.8200e-003	0.1418	0.0354	8.7600e-003	0.0441	0.0000	136.4032	136.4032	4.0600e-003	0.0000	136.5048
2025	1.6970	0.0502	0.1546	4.2000e-004	0.0376	2.1400e-003	0.0397	9.9900e-003	2.1200e-003	0.0121	0.0000	37.3771	37.3771	1.0700e-003	0.0000	37.4039
Maximum	**6.0128**	**7.6128**	**7.2234**	**0.0191**	**1.2033**	**0.3048**	**1.4936**	**0.5145**	**0.2930**	**0.7830**	**0.0000**	**1,737.1455**	**1,737.1455**	**0.1549**	**0.0000**	**1,740.9718**

2.1 Overall Construction

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.6005	6.3282	3.7419	6.8800e-003	0.5254	0.2903	0.8157	0.2158	0.2685	0.4843	0.0000	635.3858	635.3858	0.1549	0.0000	639.2594
2018	1.0372	7.6128	7.2234	0.0191	0.8141	0.3048	1.1189	0.2199	0.2930	0.5128	0.0000	1,737.1450	1,737.1450	0.1531	0.0000	1,740.9713
2019	0.9226	7.0269	6.7301	0.0188	0.8141	0.2631	1.0772	0.2199	0.2529	0.4727	0.0000	1,710.4215	1,710.4215	0.1457	0.0000	1,714.0649
2020	0.8266	6.4357	6.3328	0.0186	0.8172	0.2250	1.0422	0.2207	0.2163	0.4369	0.0000	1,688.8897	1,688.8897	0.1382	0.0000	1,692.3437
2021	1.8440	3.0891	3.3578	9.2000e-003	0.3839	0.1117	0.4956	0.1035	0.1063	0.2098	0.0000	831.2057	831.2057	0.0854	0.0000	833.3406
2022	5.9779	0.2207	0.6337	1.6100e-003	0.1320	0.0115	0.1435	0.0351	0.0114	0.0465	0.0000	143.5136	143.5136	4.8600e-003	0.0000	143.6351
2023	5.9720	0.2030	0.5980	1.5600e-003	0.1320	0.0101	0.1421	0.0351	9.9900e-003	0.0451	0.0000	139.3994	139.3994	4.3900e-003	0.0000	139.5092
2024	6.0128	0.1901	0.5742	1.5300e-003	0.1330	8.8200e-003	0.1418	0.0354	8.7600e-003	0.0441	0.0000	136.4031	136.4031	4.0600e-003	0.0000	136.5047
2025	1.6970	0.0502	0.1546	4.2000e-004	0.0376	2.1400e-003	0.0397	9.9900e-003	2.1200e-003	0.0121	0.0000	37.3771	37.3771	1.0700e-003	0.0000	37.4039
Maximum	**6.0128**	**7.6128**	**7.2234**	**0.0191**	**0.8172**	**0.3048**	**1.1189**	**0.2207**	**0.2930**	**0.5128**	**0.0000**	**1,737.1450**	**1,737.1450**	**0.1549**	**0.0000**	**1,740.9713**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**15.18**	**0.00**	**11.91**	**21.43**	**0.00**	**11.66**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	6-1-2017	8-31-2017	2.8128	2.8128

2	**9-1-2017**	**11-30-2017**	3.3500	3.3500
3	**12-1-2017**	**2-28-2018**	2.2210	2.2210
4	**3-1-2018**	**5-31-2018**	2.1790	2.1790
5	**6-1-2018**	**8-31-2018**	2.1719	2.1719
6	**9-1-2018**	**11-30-2018**	2.1623	2.1623
7	**12-1-2018**	**2-28-2019**	2.0309	2.0309
8	**3-1-2019**	**5-31-2019**	2.0026	2.0026
9	**6-1-2019**	**8-31-2019**	1.9965	1.9965
10	**9-1-2019**	**11-30-2019**	1.9868	1.9868
11	**12-1-2019**	**2-29-2020**	1.8739	1.8739
12	**3-1-2020**	**5-31-2020**	1.8231	1.8231
13	**6-1-2020**	**8-31-2020**	1.8184	1.8184
14	**9-1-2020**	**11-30-2020**	1.8080	1.8080
15	**12-1-2020**	**2-28-2021**	1.6816	1.6816
16	**3-1-2021**	**5-31-2021**	1.6523	1.6523
17	**6-1-2021**	**8-31-2021**	0.5204	0.5204
18	**9-1-2021**	**11-30-2021**	1.1495	1.1495
19	**12-1-2021**	**2-28-2022**	1.5368	1.5368
20	**3-1-2022**	**5-31-2022**	1.5682	1.5682
21	**6-1-2022**	**8-31-2022**	1.5680	1.5680
22	**9-1-2022**	**11-30-2022**	1.5513	1.5513
23	**12-1-2022**	**2-28-2023**	1.5305	1.5305
24	**3-1-2023**	**5-31-2023**	1.5621	1.5621
25	**6-1-2023**	**8-31-2023**	1.5619	1.5619
26	**9-1-2023**	**11-30-2023**	1.5453	1.5453
27	**12-1-2023**	**2-29-2024**	1.5422	1.5422
28	**3-1-2024**	**5-31-2024**	1.5571	1.5571

29	**6-1-2024**	**8-31-2024**	1.5569	1.5569
30	**9-1-2024**	**11-30-2024**	1.5403	1.5403
31	**12-1-2024**	**2-28-2025**	1.5207	1.5207
32	**3-1-2025**	**5-31-2025**	0.7596	0.7596
		Highest	3.3500	3.3500

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	11.3429	0.5822	9.6276	3.5200e-003		0.0901	0.0901		0.0901	0.0901	0.0000	563.3545	563.3545	0.0255	0.0101	566.9854
Energy	0.2087	1.7915	0.8191	0.0114		0.1442	0.1442		0.1442	0.1442	0.0000	5,882.0240	5,882.0240	0.2122	0.0736	5,909.2519
Mobile	7.7360	80.7801	75.1677	0.3227	18.2962	0.3589	18.6551	4.9224	0.3399	5.2623	0.0000	29,948.9491	29,948.9491	2.2548	0.0000	30,005.3196
Waste						0.0000	0.0000		0.0000	0.0000	310.8685	0.0000	310.8685	18.3718	0.0000	770.1635
Water						0.0000	0.0000		0.0000	0.0000	31.7372	221.3705	253.1077	3.2697	0.0790	358.4047
Total	**19.2876**	**83.1538**	**85.6143**	**0.3376**	**18.2962**	**0.5932**	**18.8894**	**4.9224**	**0.5741**	**5.4965**	**342.6057**	**36,615.6981**	**36,958.3038**	**24.1340**	**0.1627**	**37,610.1251**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	10.6764	0.5822	9.6276	3.5200e-003		0.0901	0.0901		0.0901	0.0901	0.0000	563.3545	563.3545	0.0255	0.0101	566.9854
Energy	0.1802	1.5469	0.7068	9.8300e-003		0.1245	0.1245		0.1245	0.1245	0.0000	5,309.3006	5,309.3006	0.1936	0.0657	5,333.7139
Mobile	7.4595	77.3384	69.9147	0.2967	16.5123	0.3283	16.8406	4.4425	0.3108	4.7533	0.0000	27,548.4244	27,548.4244	2.1913	0.0000	27,603.2072
Waste						0.0000	0.0000		0.0000	0.0000	310.8685	0.0000	310.8685	18.3718	0.0000	770.1635
Water						0.0000	0.0000		0.0000	0.0000	25.3898	185.9785	211.3682	2.6162	0.0633	295.6407
Total	**18.3161**	**79.4675**	**80.2490**	**0.3101**	**16.5123**	**0.5429**	**17.0552**	**4.4425**	**0.5254**	**4.9679**	**336.2582**	**33,607.0580**	**33,943.3163**	**23.3984**	**0.1391**	**34,569.7106**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**5.04**	**4.43**	**6.27**	**8.15**	**9.75**	**8.49**	**9.71**	**9.75**	**8.49**	**9.62**	**1.85**	**8.22**	**8.16**	**3.05**	**14.51**	**8.08**

2.3 Vegetation

Vegetation

	CO2e
Category	MT
Vegetation Land Change	-1,474.9800
Total	**-1,474.9800**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	6/1/2017	6/1/2017	5	1	
2	Site Preparation	Site Preparation	6/2/2017	7/7/2017	5	26	
3	Grading	Grading	7/8/2017	11/24/2017	5	100	
4	Paving	Paving	6/5/2021	10/4/2021	5	86	
5	Building Construction	Building Construction	11/25/2017	6/4/2021	5	920	
6	Architectural Coating	Architectural Coating	10/5/2021	4/14/2025	5	920	

Acres of Grading (Site Preparation Phase): 258.29

Acres of Grading (Grading Phase): 258.29

Acres of Paving: 0

Residential Indoor: 4,141,125; Residential Outdoor: 1,380,375; Non-Residential Indoor: 356,757; Non-Residential Outdoor: 118,919; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
	Air Compressors	4	6.00	78	0.48
Architectural Coating	Air Compressors	1	6.00	78	0.48
Building Construction	Cranes	1	3.00	231	0.29
Building Construction	Forklifts	4	8.00	89	0.20
Building Construction	Generator Sets	4	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	4	4.00	97	0.37
Building Construction	Welders	1	4.00	46	0.45
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	1	8.00	158	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Excavators	4	8.00	158	0.38
Grading	Graders	2	8.00	187	0.41
Grading	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	127.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	14	636.00	174.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	3	8.00	0.00	4.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	12	30.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.0000e-004	0.0000	4.0000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.0800e-003	0.0108	5.8600e-003	1.0000e-005		5.8000e-004	5.8000e-004		5.4000e-004	5.4000e-004	0.0000	0.9047	0.9047	2.2000e-004	0.0000	0.9102
Total	**1.0800e-003**	**0.0108**	**5.8600e-003**	**1.0000e-005**	**4.0000e-004**	**5.8000e-004**	**9.8000e-004**	**6.0000e-005**	**5.4000e-004**	**6.0000e-004**	**0.0000**	**0.9047**	**0.9047**	**2.2000e-004**	**0.0000**	**0.9102**

3.2 Demolition - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	6.8000e-004	1.0000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1567	0.1567	1.0000e-005	0.0000	0.1570
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-005	2.0000e-005	1.7000e-004	0.0000	3.0000e-005	0.0000	3.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0314	0.0314	0.0000	0.0000	0.0314
Total	**4.0000e-005**	**7.0000e-004**	**2.7000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**7.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.1881**	**0.1881**	**1.0000e-005**	**0.0000**	**0.1884**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.6000e-004	0.0000	1.6000e-004	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.0800e-003	0.0108	5.8600e-003	1.0000e-005		5.8000e-004	5.8000e-004		5.4000e-004	5.4000e-004	0.0000	0.9047	0.9047	2.2000e-004	0.0000	0.9102
Total	**1.0800e-003**	**0.0108**	**5.8600e-003**	**1.0000e-005**	**1.6000e-004**	**5.8000e-004**	**7.4000e-004**	**2.0000e-005**	**5.4000e-004**	**5.6000e-004**	**0.0000**	**0.9047**	**0.9047**	**2.2000e-004**	**0.0000**	**0.9102**

3.2 Demolition - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	6.8000e-004	1.0000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1567	0.1567	1.0000e-005	0.0000	0.1570
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-005	2.0000e-005	1.7000e-004	0.0000	3.0000e-005	0.0000	3.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0314	0.0314	0.0000	0.0000	0.0314
Total	**4.0000e-005**	**7.0000e-004**	**2.7000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**7.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.1881**	**0.1881**	**1.0000e-005**	**0.0000**	**0.1884**

3.3 Site Preparation - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3718	0.0000	0.3718	0.1439	0.0000	0.1439	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0645	0.6796	0.3049	4.9000e-004		0.0374	0.0374		0.0344	0.0344	0.0000	45.9347	45.9347	0.0141	0.0000	46.2866
Total	**0.0645**	**0.6796**	**0.3049**	**4.9000e-004**	**0.3718**	**0.0374**	**0.4092**	**0.1439**	**0.0344**	**0.1783**	**0.0000**	**45.9347**	**45.9347**	**0.0141**	**0.0000**	**46.2866**

3.3 Site Preparation - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3700e-003	1.0200e-003	0.0101	2.0000e-005	1.8700e-003	1.0000e-005	1.8900e-003	5.0000e-004	1.0000e-005	5.1000e-004	0.0000	1.8343	1.8343	7.0000e-005	0.0000	1.8362
Total	**1.3700e-003**	**1.0200e-003**	**0.0101**	**2.0000e-005**	**1.8700e-003**	**1.0000e-005**	**1.8900e-003**	**5.0000e-004**	**1.0000e-005**	**5.1000e-004**	**0.0000**	**1.8343**	**1.8343**	**7.0000e-005**	**0.0000**	**1.8362**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1450	0.0000	0.1450	0.0561	0.0000	0.0561	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0645	0.6796	0.3049	4.9000e-004		0.0374	0.0374		0.0344	0.0344	0.0000	45.9347	45.9347	0.0141	0.0000	46.2865
Total	**0.0645**	**0.6796**	**0.3049**	**4.9000e-004**	**0.1450**	**0.0374**	**0.1824**	**0.0561**	**0.0344**	**0.0906**	**0.0000**	**45.9347**	**45.9347**	**0.0141**	**0.0000**	**46.2865**

3.3 Site Preparation - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3700e-003	1.0200e-003	0.0101	2.0000e-005	1.8700e-003	1.0000e-005	1.8900e-003	5.0000e-004	1.0000e-005	5.1000e-004	0.0000	1.8343	1.8343	7.0000e-005	0.0000	1.8362
Total	**1.3700e-003**	**1.0200e-003**	**0.0101**	**2.0000e-005**	**1.8700e-003**	**1.0000e-005**	**1.8900e-003**	**5.0000e-004**	**1.0000e-005**	**5.1000e-004**	**0.0000**	**1.8343**	**1.8343**	**7.0000e-005**	**0.0000**	**1.8362**

3.4 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.7392	0.0000	0.7392	0.3458	0.0000	0.3458	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.4111	4.8306	2.6021	4.3800e-003		0.2178	0.2178		0.2004	0.2004	0.0000	406.2328	406.2328	0.1245	0.0000	409.3445
Total	**0.4111**	**4.8306**	**2.6021**	**4.3800e-003**	**0.7392**	**0.2178**	**0.9570**	**0.3458**	**0.2004**	**0.5462**	**0.0000**	**406.2328**	**406.2328**	**0.1245**	**0.0000**	**409.3445**

3.4 Grading - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.7900e-003	6.5100e-003	0.0647	1.3000e-004	0.0120	1.0000e-004	0.0121	3.1900e-003	9.0000e-005	3.2800e-003	0.0000	11.7586	11.7586	4.6000e-004	0.0000	11.7702
Total	**8.7900e-003**	**6.5100e-003**	**0.0647**	**1.3000e-004**	**0.0120**	**1.0000e-004**	**0.0121**	**3.1900e-003**	**9.0000e-005**	**3.2800e-003**	**0.0000**	**11.7586**	**11.7586**	**4.6000e-004**	**0.0000**	**11.7702**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2883	0.0000	0.2883	0.1349	0.0000	0.1349	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.4111	4.8306	2.6021	4.3800e-003		0.2178	0.2178		0.2004	0.2004	0.0000	406.2323	406.2323	0.1245	0.0000	409.3440
Total	**0.4111**	**4.8306**	**2.6021**	**4.3800e-003**	**0.2883**	**0.2178**	**0.5061**	**0.1349**	**0.2004**	**0.3353**	**0.0000**	**406.2323**	**406.2323**	**0.1245**	**0.0000**	**409.3440**

3.4 Grading - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.7900e-003	6.5100e-003	0.0647	1.3000e-004	0.0120	1.0000e-004	0.0121	3.1900e-003	9.0000e-005	3.2800e-003	0.0000	11.7586	11.7586	4.6000e-004	0.0000	11.7702
Total	**8.7900e-003**	**6.5100e-003**	**0.0647**	**1.3000e-004**	**0.0120**	**1.0000e-004**	**0.0121**	**3.1900e-003**	**9.0000e-005**	**3.2800e-003**	**0.0000**	**11.7586**	**11.7586**	**4.6000e-004**	**0.0000**	**11.7702**

3.5 Paving - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0540	0.5555	0.6301	9.8000e-004		0.0291	0.0291		0.0268	0.0268	0.0000	86.1010	86.1010	0.0279	0.0000	86.7971
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0540**	**0.5555**	**0.6301**	**9.8000e-004**		**0.0291**	**0.0291**		**0.0268**	**0.0268**	**0.0000**	**86.1010**	**86.1010**	**0.0279**	**0.0000**	**86.7971**

3.5 Paving - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.5100e-003	1.6500e-003	0.0171	5.0000e-005	5.1600e-003	4.0000e-005	5.1900e-003	1.3700e-003	3.0000e-005	1.4000e-003	0.0000	4.4697	4.4697	1.2000e-004	0.0000	4.4726
Total	**2.5100e-003**	**1.6500e-003**	**0.0171**	**5.0000e-005**	**5.1600e-003**	**4.0000e-005**	**5.1900e-003**	**1.3700e-003**	**3.0000e-005**	**1.4000e-003**	**0.0000**	**4.4697**	**4.4697**	**1.2000e-004**	**0.0000**	**4.4726**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0540	0.5555	0.6301	9.8000e-004		0.0291	0.0291		0.0268	0.0268	0.0000	86.1009	86.1009	0.0279	0.0000	86.7970
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0540**	**0.5555**	**0.6301**	**9.8000e-004**		**0.0291**	**0.0291**		**0.0268**	**0.0268**	**0.0000**	**86.1009**	**86.1009**	**0.0279**	**0.0000**	**86.7970**

3.5 Paving - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.5100e-003	1.6500e-003	0.0171	5.0000e-005	5.1600e-003	4.0000e-005	5.1900e-003	1.3700e-003	3.0000e-005	1.4000e-003	0.0000	4.4697	4.4697	1.2000e-004	0.0000	4.4726
Total	**2.5100e-003**	**1.6500e-003**	**0.0171**	**5.0000e-005**	**5.1600e-003**	**4.0000e-005**	**5.1900e-003**	**1.3700e-003**	**3.0000e-005**	**1.4000e-003**	**0.0000**	**4.4697**	**4.4697**	**1.2000e-004**	**0.0000**	**4.4726**

3.6 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0532	0.4384	0.3361	5.3000e-004		0.0307	0.0307		0.0295	0.0295	0.0000	46.2515	46.2515	7.6900e-003	0.0000	46.4438
Total	**0.0532**	**0.4384**	**0.3361**	**5.3000e-004**		**0.0307**	**0.0307**		**0.0295**	**0.0295**	**0.0000**	**46.2515**	**46.2515**	**7.6900e-003**	**0.0000**	**46.4438**

3.6 Building Construction - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0138	0.3262	0.0752	6.3000e-004	0.0144	3.1800e-003	0.0176	4.1700e-003	3.0400e-003	7.2100e-003	0.0000	59.9611	59.9611	5.4800e-003	0.0000	60.0981
Worker	0.0466	0.0345	0.3427	6.9000e-004	0.0636	5.1000e-004	0.0641	0.0169	4.7000e-004	0.0174	0.0000	62.3207	62.3207	2.4600e-003	0.0000	62.3821
Total	**0.0604**	**0.3607**	**0.4179**	**1.3200e-003**	**0.0780**	**3.6900e-003**	**0.0817**	**0.0211**	**3.5100e-003**	**0.0246**	**0.0000**	**122.2818**	**122.2818**	**7.9400e-003**	**0.0000**	**122.4802**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0532	0.4384	0.3361	5.3000e-004		0.0307	0.0307		0.0295	0.0295	0.0000	46.2514	46.2514	7.6900e-003	0.0000	46.4437
Total	**0.0532**	**0.4384**	**0.3361**	**5.3000e-004**		**0.0307**	**0.0307**		**0.0295**	**0.0295**	**0.0000**	**46.2514**	**46.2514**	**7.6900e-003**	**0.0000**	**46.4437**

3.6 Building Construction - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0138	0.3262	0.0752	6.3000e-004	0.0144	3.1800e-003	0.0176	4.1700e-003	3.0400e-003	7.2100e-003	0.0000	59.9611	59.9611	5.4800e-003	0.0000	60.0981
Worker	0.0466	0.0345	0.3427	6.9000e-004	0.0636	5.1000e-004	0.0641	0.0169	4.7000e-004	0.0174	0.0000	62.3207	62.3207	2.4600e-003	0.0000	62.3821
Total	**0.0604**	**0.3607**	**0.4179**	**1.3200e-003**	**0.0780**	**3.6900e-003**	**0.0817**	**0.0211**	**3.5100e-003**	**0.0246**	**0.0000**	**122.2818**	**122.2818**	**7.9400e-003**	**0.0000**	**122.4802**

3.6 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4830	4.0990	3.4429	5.4900e-003		0.2728	0.2728		0.2626	0.2626	0.0000	479.9793	479.9793	0.0774	0.0000	481.9141
Total	**0.4830**	**4.0990**	**3.4429**	**5.4900e-003**		**0.2728**	**0.2728**		**0.2626**	**0.2626**	**0.0000**	**479.9793**	**479.9793**	**0.0774**	**0.0000**	**481.9141**

3.6 Building Construction - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1247	3.2031	0.6842	6.5700e-003	0.1505	0.0270	0.1775	0.0435	0.0258	0.0693	0.0000	623.5869	623.5869	0.0533	0.0000	624.9181
Worker	0.4296	0.3107	3.0964	7.0200e-003	0.6636	5.0500e-003	0.6686	0.1764	4.6500e-003	0.1810	0.0000	633.5794	633.5794	0.0224	0.0000	634.1396
Total	**0.5542**	**3.5139**	**3.7805**	**0.0136**	**0.8141**	**0.0320**	**0.8461**	**0.2198**	**0.0304**	**0.2503**	**0.0000**	**1,257.1662**	**1,257.1662**	**0.0757**	**0.0000**	**1,259.0577**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4830	4.0990	3.4429	5.4900e-003		0.2728	0.2728		0.2626	0.2626	0.0000	479.9787	479.9787	0.0774	0.0000	481.9136
Total	**0.4830**	**4.0990**	**3.4429**	**5.4900e-003**		**0.2728**	**0.2728**		**0.2626**	**0.2626**	**0.0000**	**479.9787**	**479.9787**	**0.0774**	**0.0000**	**481.9136**

3.6 Building Construction - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1247	3.2031	0.6842	6.5700e-003	0.1505	0.0270	0.1775	0.0435	0.0258	0.0693	0.0000	623.5869	623.5869	0.0533	0.0000	624.9181
Worker	0.4296	0.3107	3.0964	7.0200e-003	0.6636	5.0500e-003	0.6686	0.1764	4.6500e-003	0.1810	0.0000	633.5794	633.5794	0.0224	0.0000	634.1396
Total	**0.5542**	**3.5139**	**3.7805**	**0.0136**	**0.8141**	**0.0320**	**0.8461**	**0.2198**	**0.0304**	**0.2503**	**0.0000**	**1,257.1662**	**1,257.1662**	**0.0757**	**0.0000**	**1,259.0577**

3.6 Building Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4258	3.7277	3.3980	5.4900e-003		0.2353	0.2353		0.2265	0.2265	0.0000	477.1549	477.1549	0.0745	0.0000	479.0168
Total	**0.4258**	**3.7277**	**3.3980**	**5.4900e-003**		**0.2353**	**0.2353**		**0.2265**	**0.2265**	**0.0000**	**477.1549**	**477.1549**	**0.0745**	**0.0000**	**479.0168**

3.6 Building Construction - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1109	3.0283	0.6084	6.5100e-003	0.1505	0.0229	0.1734	0.0435	0.0219	0.0654	0.0000	618.3685	618.3685	0.0516	0.0000	619.6584
Worker	0.3859	0.2710	2.7238	6.8100e-003	0.6636	4.8900e-003	0.6684	0.1764	4.5000e-003	0.1809	0.0000	614.8987	614.8987	0.0197	0.0000	615.3902
Total	**0.4968**	**3.2992**	**3.3322**	**0.0133**	**0.8141**	**0.0278**	**0.8418**	**0.2199**	**0.0264**	**0.2462**	**0.0000**	**1,233.2672**	**1,233.2672**	**0.0713**	**0.0000**	**1,235.0486**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4258	3.7276	3.3980	5.4900e-003		0.2353	0.2353		0.2265	0.2265	0.0000	477.1544	477.1544	0.0745	0.0000	479.0163
Total	**0.4258**	**3.7276**	**3.3980**	**5.4900e-003**		**0.2353**	**0.2353**		**0.2265**	**0.2265**	**0.0000**	**477.1544**	**477.1544**	**0.0745**	**0.0000**	**479.0163**

3.6 Building Construction - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1109	3.0283	0.6084	6.5100e-003	0.1505	0.0229	0.1734	0.0435	0.0219	0.0654	0.0000	618.3685	618.3685	0.0516	0.0000	619.6584
Worker	0.3859	0.2710	2.7238	6.8100e-003	0.6636	4.8900e-003	0.6684	0.1764	4.5000e-003	0.1809	0.0000	614.8987	614.8987	0.0197	0.0000	615.3902
Total	**0.4968**	**3.2992**	**3.3322**	**0.0133**	**0.8141**	**0.0278**	**0.8418**	**0.2199**	**0.0264**	**0.2462**	**0.0000**	**1,233.2672**	**1,233.2672**	**0.0713**	**0.0000**	**1,235.0486**

3.6 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3841	3.4220	3.3771	5.5100e-003		0.2050	0.2050		0.1973	0.1973	0.0000	475.2559	475.2559	0.0724	0.0000	477.0667
Total	**0.3841**	**3.4220**	**3.3771**	**5.5100e-003**		**0.2050**	**0.2050**		**0.1973**	**0.1973**	**0.0000**	**475.2559**	**475.2559**	**0.0724**	**0.0000**	**477.0667**

3.6 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0903	2.7746	0.5262	6.4800e-003	0.1511	0.0153	0.1664	0.0437	0.0146	0.0583	0.0000	615.4830	615.4830	0.0486	0.0000	616.6979
Worker	0.3522	0.2391	2.4295	6.6200e-003	0.6661	4.7500e-003	0.6708	0.1770	4.3700e-003	0.1814	0.0000	598.1513	598.1513	0.0171	0.0000	598.5797
Total	**0.4425**	**3.0137**	**2.9557**	**0.0131**	**0.8172**	**0.0200**	**0.8372**	**0.2207**	**0.0190**	**0.2397**	**0.0000**	**1,213.6343**	**1,213.6343**	**0.0657**	**0.0000**	**1,215.2776**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3841	3.4220	3.3771	5.5100e-003		0.2050	0.2050		0.1973	0.1973	0.0000	475.2553	475.2553	0.0724	0.0000	477.0661
Total	**0.3841**	**3.4220**	**3.3771**	**5.5100e-003**		**0.2050**	**0.2050**		**0.1973**	**0.1973**	**0.0000**	**475.2553**	**475.2553**	**0.0724**	**0.0000**	**477.0661**

3.6 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0903	2.7746	0.5262	6.4800e-003	0.1511	0.0153	0.1664	0.0437	0.0146	0.0583	0.0000	615.4830	615.4830	0.0486	0.0000	616.6979
Worker	0.3522	0.2391	2.4295	6.6200e-003	0.6661	4.7500e-003	0.6708	0.1770	4.3700e-003	0.1814	0.0000	598.1513	598.1513	0.0171	0.0000	598.5797
Total	**0.4425**	**3.0137**	**2.9557**	**0.0131**	**0.8172**	**0.0200**	**0.8372**	**0.2207**	**0.0190**	**0.2397**	**0.0000**	**1,213.6343**	**1,213.6343**	**0.0657**	**0.0000**	**1,215.2776**

3.6 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1458	1.3179	1.4171	2.3400e-003		0.0744	0.0744		0.0716	0.0716	0.0000	201.3612	201.3612	0.0299	0.0000	202.1096
Total	**0.1458**	**1.3179**	**1.4171**	**2.3400e-003**		**0.0744**	**0.0744**		**0.0716**	**0.0716**	**0.0000**	**201.3612**	**201.3612**	**0.0299**	**0.0000**	**202.1096**

3.6 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0311	1.0648	0.1943	2.7200e-003	0.0640	3.0000e-003	0.0670	0.0185	2.8700e-003	0.0214	0.0000	258.3355	258.3355	0.0197	0.0000	258.8286
Worker	0.1375	0.0900	0.9336	2.7100e-003	0.2822	1.9400e-003	0.2841	0.0750	1.7900e-003	0.0768	0.0000	244.6059	244.6059	6.4600e-003	0.0000	244.7675
Total	**0.1686**	**1.1548**	**1.1279**	**5.4300e-003**	**0.3462**	**4.9400e-003**	**0.3512**	**0.0935**	**4.6600e-003**	**0.0982**	**0.0000**	**502.9413**	**502.9413**	**0.0262**	**0.0000**	**503.5961**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1458	1.3179	1.4171	2.3400e-003		0.0744	0.0744		0.0716	0.0716	0.0000	201.3609	201.3609	0.0299	0.0000	202.1093
Total	**0.1458**	**1.3179**	**1.4171**	**2.3400e-003**		**0.0744**	**0.0744**		**0.0716**	**0.0716**	**0.0000**	**201.3609**	**201.3609**	**0.0299**	**0.0000**	**202.1093**

3.6 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0311	1.0648	0.1943	2.7200e-003	0.0640	3.0000e-003	0.0670	0.0185	2.8700e-003	0.0214	0.0000	258.3355	258.3355	0.0197	0.0000	258.8286
Worker	0.1375	0.0900	0.9336	2.7100e-003	0.2822	1.9400e-003	0.2841	0.0750	1.7900e-003	0.0768	0.0000	244.6059	244.6059	6.4600e-003	0.0000	244.7675
Total	**0.1686**	**1.1548**	**1.1279**	**5.4300e-003**	**0.3462**	**4.9400e-003**	**0.3512**	**0.0935**	**4.6600e-003**	**0.0982**	**0.0000**	**502.9413**	**502.9413**	**0.0262**	**0.0000**	**503.5961**

3.7 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.4503					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.0000e-003	0.0489	0.0582	1.0000e-004		3.0100e-003	3.0100e-003		3.0100e-003	3.0100e-003	0.0000	8.1704	8.1704	5.6000e-004	0.0000	8.1844
Total	**1.4573**	**0.0489**	**0.0582**	**1.0000e-004**		**3.0100e-003**	**3.0100e-003**		**3.0100e-003**	**3.0100e-003**	**0.0000**	**8.1704**	**8.1704**	**5.6000e-004**	**0.0000**	**8.1844**

3.7 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0158	0.0104	0.1075	3.1000e-004	0.0325	2.2000e-004	0.0327	8.6400e-003	2.1000e-004	8.8400e-003	0.0000	28.1625	28.1625	7.4000e-004	0.0000	28.1811
Total	**0.0158**	**0.0104**	**0.1075**	**3.1000e-004**	**0.0325**	**2.2000e-004**	**0.0327**	**8.6400e-003**	**2.1000e-004**	**8.8400e-003**	**0.0000**	**28.1625**	**28.1625**	**7.4000e-004**	**0.0000**	**28.1811**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.4503					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.0000e-003	0.0489	0.0582	1.0000e-004		3.0100e-003	3.0100e-003		3.0100e-003	3.0100e-003	0.0000	8.1704	8.1704	5.6000e-004	0.0000	8.1844
Total	**1.4573**	**0.0489**	**0.0582**	**1.0000e-004**		**3.0100e-003**	**3.0100e-003**		**3.0100e-003**	**3.0100e-003**	**0.0000**	**8.1704**	**8.1704**	**5.6000e-004**	**0.0000**	**8.1844**

3.7 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0158	0.0104	0.1075	3.1000e-004	0.0325	2.2000e-004	0.0327	8.6400e-003	2.1000e-004	8.8400e-003	0.0000	28.1625	28.1625	7.4000e-004	0.0000	28.1811
Total	**0.0158**	**0.0104**	**0.1075**	**3.1000e-004**	**0.0325**	**2.2000e-004**	**0.0327**	**8.6400e-003**	**2.1000e-004**	**8.8400e-003**	**0.0000**	**28.1625**	**28.1625**	**7.4000e-004**	**0.0000**	**28.1811**

3.7 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.8917					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0266	0.1831	0.2358	3.9000e-004		0.0106	0.0106		0.0106	0.0106	0.0000	33.1923	33.1923	2.1600e-003	0.0000	33.2463
Total	**5.9183**	**0.1831**	**0.2358**	**3.9000e-004**		**0.0106**	**0.0106**		**0.0106**	**0.0106**	**0.0000**	**33.1923**	**33.1923**	**2.1600e-003**	**0.0000**	**33.2463**

3.7 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0596	0.0376	0.3979	1.2200e-003	0.1320	8.8000e-004	0.1329	0.0351	8.1000e-004	0.0359	0.0000	110.3214	110.3214	2.7000e-003	0.0000	110.3888
Total	**0.0596**	**0.0376**	**0.3979**	**1.2200e-003**	**0.1320**	**8.8000e-004**	**0.1329**	**0.0351**	**8.1000e-004**	**0.0359**	**0.0000**	**110.3214**	**110.3214**	**2.7000e-003**	**0.0000**	**110.3888**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.8917					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0266	0.1831	0.2358	3.9000e-004		0.0106	0.0106		0.0106	0.0106	0.0000	33.1923	33.1923	2.1600e-003	0.0000	33.2463
Total	**5.9183**	**0.1831**	**0.2358**	**3.9000e-004**		**0.0106**	**0.0106**		**0.0106**	**0.0106**	**0.0000**	**33.1923**	**33.1923**	**2.1600e-003**	**0.0000**	**33.2463**

3.7 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0596	0.0376	0.3979	1.2200e-003	0.1320	8.8000e-004	0.1329	0.0351	8.1000e-004	0.0359	0.0000	110.3214	110.3214	2.7000e-003	0.0000	110.3888
Total	**0.0596**	**0.0376**	**0.3979**	**1.2200e-003**	**0.1320**	**8.8000e-004**	**0.1329**	**0.0351**	**8.1000e-004**	**0.0359**	**0.0000**	**110.3214**	**110.3214**	**2.7000e-003**	**0.0000**	**110.3888**

3.7 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.8917					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0249	0.1694	0.2355	3.9000e-004		9.2100e-003	9.2100e-003		9.2100e-003	9.2100e-003	0.0000	33.1923	33.1923	1.9900e-003	0.0000	33.2419
Total	**5.9167**	**0.1694**	**0.2355**	**3.9000e-004**		**9.2100e-003**	**9.2100e-003**		**9.2100e-003**	**9.2100e-003**	**0.0000**	**33.1923**	**33.1923**	**1.9900e-003**	**0.0000**	**33.2419**

3.7 Architectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0553	0.0336	0.3625	1.1700e-003	0.1320	8.6000e-004	0.1329	0.0351	7.9000e-004	0.0359	0.0000	106.2072	106.2072	2.4000e-003	0.0000	106.2673
Total	**0.0553**	**0.0336**	**0.3625**	**1.1700e-003**	**0.1320**	**8.6000e-004**	**0.1329**	**0.0351**	**7.9000e-004**	**0.0359**	**0.0000**	**106.2072**	**106.2072**	**2.4000e-003**	**0.0000**	**106.2673**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.8917					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0249	0.1694	0.2354	3.9000e-004		9.2100e-003	9.2100e-003		9.2100e-003	9.2100e-003	0.0000	33.1923	33.1923	1.9900e-003	0.0000	33.2419
Total	**5.9167**	**0.1694**	**0.2354**	**3.9000e-004**		**9.2100e-003**	**9.2100e-003**		**9.2100e-003**	**9.2100e-003**	**0.0000**	**33.1923**	**33.1923**	**1.9900e-003**	**0.0000**	**33.2419**

3.7 Architectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0553	0.0336	0.3625	1.1700e-003	0.1320	8.6000e-004	0.1329	0.0351	7.9000e-004	0.0359	0.0000	106.2072	106.2072	2.4000e-003	0.0000	106.2673
Total	**0.0553**	**0.0336**	**0.3625**	**1.1700e-003**	**0.1320**	**8.6000e-004**	**0.1329**	**0.0351**	**7.9000e-004**	**0.0359**	**0.0000**	**106.2072**	**106.2072**	**2.4000e-003**	**0.0000**	**106.2673**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.9371					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0237	0.1597	0.2371	3.9000e-004		7.9800e-003	7.9800e-003		7.9800e-003	7.9800e-003	0.0000	33.4476	33.4476	1.8800e-003	0.0000	33.4947
Total	**5.9607**	**0.1597**	**0.2371**	**3.9000e-004**		**7.9800e-003**	**7.9800e-003**		**7.9800e-003**	**7.9800e-003**	**0.0000**	**33.4476**	**33.4476**	**1.8800e-003**	**0.0000**	**33.4947**

3.7 Architectural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0520	0.0305	0.3371	1.1400e-003	0.1330	8.4000e-004	0.1339	0.0354	7.8000e-004	0.0361	0.0000	102.9555	102.9555	2.1800e-003	0.0000	103.0100
Total	**0.0520**	**0.0305**	**0.3371**	**1.1400e-003**	**0.1330**	**8.4000e-004**	**0.1339**	**0.0354**	**7.8000e-004**	**0.0361**	**0.0000**	**102.9555**	**102.9555**	**2.1800e-003**	**0.0000**	**103.0100**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.9371					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0237	0.1597	0.2371	3.9000e-004		7.9800e-003	7.9800e-003		7.9800e-003	7.9800e-003	0.0000	33.4476	33.4476	1.8800e-003	0.0000	33.4947
Total	**5.9607**	**0.1597**	**0.2371**	**3.9000e-004**		**7.9800e-003**	**7.9800e-003**		**7.9800e-003**	**7.9800e-003**	**0.0000**	**33.4476**	**33.4476**	**1.8800e-003**	**0.0000**	**33.4947**

3.7 Architectural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0520	0.0305	0.3371	1.1400e-003	0.1330	8.4000e-004	0.1339	0.0354	7.8000e-004	0.0361	0.0000	102.9555	102.9555	2.1800e-003	0.0000	103.0100
Total	**0.0520**	**0.0305**	**0.3371**	**1.1400e-003**	**0.1330**	**8.4000e-004**	**0.1339**	**0.0354**	**7.8000e-004**	**0.0361**	**0.0000**	**102.9555**	**102.9555**	**2.1800e-003**	**0.0000**	**103.0100**

3.7 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.6769					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.3200e-003	0.0424	0.0669	1.1000e-004		1.9100e-003	1.9100e-003		1.9100e-003	1.9100e-003	0.0000	9.4470	9.4470	5.2000e-004	0.0000	9.4599
Total	**1.6832**	**0.0424**	**0.0669**	**1.1000e-004**		**1.9100e-003**	**1.9100e-003**		**1.9100e-003**	**1.9100e-003**	**0.0000**	**9.4470**	**9.4470**	**5.2000e-004**	**0.0000**	**9.4599**

3.7 Architectural Coating - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0138	7.7800e-003	0.0877	3.1000e-004	0.0376	2.3000e-004	0.0378	9.9900e-003	2.1000e-004	0.0102	0.0000	27.9301	27.9301	5.5000e-004	0.0000	27.9440
Total	**0.0138**	**7.7800e-003**	**0.0877**	**3.1000e-004**	**0.0376**	**2.3000e-004**	**0.0378**	**9.9900e-003**	**2.1000e-004**	**0.0102**	**0.0000**	**27.9301**	**27.9301**	**5.5000e-004**	**0.0000**	**27.9440**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.6769					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.3200e-003	0.0424	0.0669	1.1000e-004		1.9100e-003	1.9100e-003		1.9100e-003	1.9100e-003	0.0000	9.4470	9.4470	5.2000e-004	0.0000	9.4599
Total	**1.6832**	**0.0424**	**0.0669**	**1.1000e-004**		**1.9100e-003**	**1.9100e-003**		**1.9100e-003**	**1.9100e-003**	**0.0000**	**9.4470**	**9.4470**	**5.2000e-004**	**0.0000**	**9.4599**

3.7 Architectural Coating - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0138	7.7800e-003	0.0877	3.1000e-004	0.0376	2.3000e-004	0.0378	9.9900e-003	2.1000e-004	0.0102	0.0000	27.9301	27.9301	5.5000e-004	0.0000	27.9440
Total	**0.0138**	**7.7800e-003**	**0.0877**	**3.1000e-004**	**0.0376**	**2.3000e-004**	**0.0378**	**9.9900e-003**	**2.1000e-004**	**0.0102**	**0.0000**	**27.9301**	**27.9301**	**5.5000e-004**	**0.0000**	**27.9440**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Density

Improve Walkability Design

Improve Destination Accessibility

Increase Transit Accessibility

Improve Pedestrian Network

Provide Traffic Calming Measures

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	7.4595	77.3384	69.9147	0.2967	16.5123	0.3283	16.8406	4.4425	0.3108	4.7533	0.0000	27,548.4244	27,548.4244	2.1913	0.0000	27,603.2072
Unmitigated	7.7360	80.7801	75.1677	0.3227	18.2962	0.3589	18.6551	4.9224	0.3399	5.2623	0.0000	29,948.9491	29,948.9491	2.2548	0.0000	30,005.3196

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Low Rise	1,847.30	2,076.40	1760.30	5,411,963	4,884,296
Regional Shopping Center	9,730.03	11,884.86	6003.08	16,665,943	15,041,014
Single Family Housing	8,892.00	9,662.25	8404.50	25,884,438	23,360,705
Total	20,469.33	23,623.51	16,167.88	47,962,344	43,286,015

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Low Rise	10.80	7.30	7.50	45.60	19.00	35.40	86	11	3
Regional Shopping Center	9.50	7.30	7.30	16.30	64.70	19.00	54	35	11
Single Family Housing	10.80	7.30	7.50	45.60	19.00	35.40	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Low Rise	0.499524	0.033454	0.168279	0.130431	0.021581	0.005690	0.021752	0.108566	0.001799	0.001690	0.005397	0.000987	0.000848
Single Family Housing	0.499524	0.033454	0.168279	0.130431	0.021581	0.005690	0.021752	0.108566	0.001799	0.001690	0.005397	0.000987	0.000848
Regional Shopping Center	0.499524	0.033454	0.168279	0.130431	0.021581	0.005690	0.021752	0.108566	0.001799	0.001690	0.005397	0.000987	0.000848

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

Install High Efficiency Lighting

Install Energy Efficient Appliances

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	3,525.9809	3,525.9809	0.1594	0.0330	3,539.7967
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	3,816.8164	3,816.8164	0.1726	0.0357	3,831.7719
NaturalGas Mitigated	0.1802	1.5469	0.7068	9.8300e-003		0.1245	0.1245		0.1245	0.1245	0.0000	1,783.3197	1,783.3197	0.0342	0.0327	1,793.9171
NaturalGas Unmitigated	0.2087	1.7915	0.8191	0.0114		0.1442	0.1442		0.1442	0.1442	0.0000	2,065.2075	2,065.2075	0.0396	0.0379	2,077.4800

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Low Rise	4.71776e+006	0.0254	0.2174	0.0925	1.3900e-003		0.0176	0.0176		0.0176	0.0176	0.0000	251.7575	251.7575	4.8300e-003	4.6200e-003	253.2536
Regional Shopping Center	2.7946e+006	0.0151	0.1370	0.1151	8.2000e-004		0.0104	0.0104		0.0104	0.0104	0.0000	149.1303	149.1303	2.8600e-003	2.7300e-003	150.0165
Single Family Housing	3.11882e+007	0.1682	1.4371	0.6115	9.1700e-003		0.1162	0.1162		0.1162	0.1162	0.0000	1,664.3197	1,664.3197	0.0319	0.0305	1,674.2099
Total		**0.2087**	**1.7915**	**0.8191**	**0.0114**		**0.1442**	**0.1442**		**0.1442**	**0.1442**	**0.0000**	**2,065.2075**	**2,065.2075**	**0.0396**	**0.0379**	**2,077.4800**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Low Rise	4.12698e+006	0.0223	0.1902	0.0809	1.2100e-003		0.0154	0.0154		0.0154	0.0154	0.0000	220.2313	220.2313	4.2200e-003	4.0400e-003	221.5400
Regional Shopping Center	2.38825e+006	0.0129	0.1171	0.0983	7.0000e-004		8.9000e-003	8.9000e-003		8.9000e-003	8.9000e-003	0.0000	127.4461	127.4461	2.4400e-003	2.3400e-003	128.2035
Single Family Housing	2.69029e+007	0.1451	1.2396	0.5275	7.9100e-003		0.1002	0.1002		0.1002	0.1002	0.0000	1,435.6423	1,435.6423	0.0275	0.0263	1,444.1736
Total		**0.1802**	**1.5469**	**0.7068**	**9.8200e-003**		**0.1245**	**0.1245**		**0.1245**	**0.1245**	**0.0000**	**1,783.3197**	**1,783.3197**	**0.0342**	**0.0327**	**1,793.9171**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Low Rise	1.40112e+006	407.6020	0.0184	3.8100e-003	409.1991
Regional Shopping Center	2.88735e+006	839.9642	0.0380	7.8600e-003	843.2554
Single Family Housing	8.83173e+006	2,569.2502	0.1162	0.0240	2,579.3173
Total		**3,816.8164**	**0.1726**	**0.0357**	**3,831.7719**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Low Rise	1.30565e+006	379.8287	0.0172	3.5500e-003	381.3170
Regional Shopping Center	2.51043e+006	730.3122	0.0330	6.8300e-003	733.1738
Single Family Housing	8.30438e+006	2,415.8400	0.1092	0.0226	2,425.3060
Total		**3,525.9809**	**0.1594**	**0.0330**	**3,539.7967**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

Use Low VOC Paint - Non-Residential Interior

Use Low VOC Paint - Non-Residential Exterior

Use only Natural Gas Hearths

Use Low VOC Cleaning Supplies

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	10.6764	0.5822	9.6276	3.5200e-003		0.0901	0.0901		0.0901	0.0901	0.0000	563.3545	563.3545	0.0255	0.0101	566.9854
Unmitigated	11.3429	0.5822	9.6276	3.5200e-003		0.0901	0.0901		0.0901	0.0901	0.0000	563.3545	563.3545	0.0255	0.0101	566.9854

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.0848					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	8.9156					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0554	0.4732	0.2014	3.0200e-003		0.0383	0.0383		0.0383	0.0383	0.0000	548.0074	548.0074	0.0105	0.0101	551.2639
Landscaping	0.2872	0.1090	9.4262	5.0000e-004		0.0518	0.0518		0.0518	0.0518	0.0000	15.3472	15.3472	0.0150	0.0000	15.7215
Total	**11.3429**	**0.5822**	**9.6276**	**3.5200e-003**		**0.0901**	**0.0901**		**0.0901**	**0.0901**	**0.0000**	**563.3545**	**563.3545**	**0.0255**	**0.0101**	**566.9854**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.0848					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	8.2490					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0554	0.4732	0.2014	3.0200e-003		0.0383	0.0383		0.0383	0.0383	0.0000	548.0074	548.0074	0.0105	0.0101	551.2639
Landscaping	0.2872	0.1090	9.4262	5.0000e-004		0.0518	0.0518		0.0518	0.0518	0.0000	15.3472	15.3472	0.0150	0.0000	15.7215
Total	**10.6764**	**0.5822**	**9.6276**	**3.5200e-003**		**0.0901**	**0.0901**		**0.0901**	**0.0901**	**0.0000**	**563.3545**	**563.3545**	**0.0255**	**0.0101**	**566.9854**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	211.3682	2.6162	0.0633	295.6407
Unmitigated	253.1077	3.2697	0.0790	358.4047

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Low Rise	18.8947 / 11.9119	47.8655	0.6176	0.0149	67.7538
Regional Shopping Center	17.6174 / 10.7978	44.3153	0.5758	0.0139	62.8580
Single Family Housing	63.5252 / 40.0485	160.9270	2.0763	0.0502	227.7929
Total		**253.1077**	**3.2697**	**0.0790**	**358.4047**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Low Rise	15.1157 / 11.1852	39.9782	0.4941	0.0120	55.8955
Regional Shopping Center	14.0939 / 10.1391	36.9805	0.4607	0.0112	51.8206
Single Family Housing	50.8201 / 37.6055	134.4096	1.6613	0.0402	187.9246
Total		**211.3682**	**2.6162**	**0.0633**	**295.6407**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	310.8685	18.3718	0.0000	770.1635
Unmitigated	310.8685	18.3718	0.0000	770.1635

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Low Rise	133.4	27.0790	1.6003	0.0000	67.0871
Regional Shopping Center	249.73	50.6929	2.9959	0.0000	125.5896
Single Family Housing	1148.31	233.0966	13.7756	0.0000	577.4868
Total		**310.8685**	**18.3718**	**0.0000**	**770.1635**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Low Rise	133.4	27.0790	1.6003	0.0000	67.0871
Regional Shopping Center	249.73	50.6929	2.9959	0.0000	125.5896
Single Family Housing	1148.31	233.0966	13.7756	0.0000	577.4868
Total		**310.8685**	**18.3718**	**0.0000**	**770.1635**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

	Total CO2	CH4	N2O	CO2e
Category	MT			
Unmitigated	-1,474.9800	0.0000	0.0000	-1,474.9800

11.1 Vegetation Land Change

Vegetation Type

	Initial/Final	Total CO2	CH4	N2O	CO2e
	Acres	MT			
Cropland	237.9 / 0	-1,474.9800	0.0000	0.0000	-1,474.9800
Total		**-1,474.9800**	**0.0000**	**0.0000**	**-1,474.9800**

Off-road Mobile (Construction) Energy Usage

Note: For the sake of simplicity, and as a conservative estimation, it was assumed that all off-roadvehicles use diesel fuel as an energy source.

Given Factor:	**1,916.10**	**metric tons**	**CO2**	**(provided in CalEEMod Output File)**
Conversion Factor:	2204.62	pounds	per metric ton	
Intermediate Result:	**4,224,271**	**pounds**	**CO2**	
Conversion Factor:	22.38	pounds	CO2 per 1 gallon of diesel fuel	(Source: U.S. EIA, 2016. http://www.eia.gov/tools/faqs/faq.cfm?id=307&t=11)
Final Result:	**188,752.07**	**gallons**	**diesel fuel**	

On-road Mobile (Operational) Energy Usage

Note: For the sake of simplicity, it was assumed that passenger vehicles, light duty trucks, motorcycles, and mobile homes use gasoline, and all medium-duty trucks, heavy-duty trucks, and buses use diesel fuel.

Unmitigated:

Step 1: **Total Daily Trips (provided by Fehr & Peers)**

21,366

Res H-W	*Res H-S*	*Res H-O*
Trip Length (miles) (provided by CalEEMod)		
10.8	7.3	7.5
Trip %		
45.60%	19.00%	35.40%

Average Trip Length (weighted average)

8.9668

Therefore:

Average Daily VMT:

191,585

Step 2: Given:

Fleet Mix (provided by CalEEMod v2016.3.1)

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
49.2%	3.4%	16.7%	13.7%	2.3%	0.6%	2.2%	10.7%	1.8%	1.8%	0.5%	0.1%	0.1%

And:

Gasoline MPG Factors for each Vehicle Class (from EMFAC2014) - Year 2019

LDA	LDT1	LDT2	MDV	MCY	MH
28.083054	23.43092	20.81049	15.21590043	36.66568852	6.512570044

Diesel MPG Factors for each Vehicle Class (from EMFAC2014) - Year 2019

LHD1	LHD2	MHD	HHD	OBUS	UBUS	SBUS
17.132745	15.46403	7.962338	5.864298838	8.057709629	4.590899125	7.1981

Therefore:

Weighted Average MPG Factors

Gasoline: **24.4** Diesel: **6.7**

Step 3: **Therefore:**

6586 daily gallons of gasoline **5527 daily gallons of diesel**

or

2,403,810 annual gallons of gasoline	**2,017,333 annual gallons of diesel**

On-road Mobile (Construction) Energy Usage - Demolition

Step 1: **Total Daily Worker Trips (provided by CalEEMod)**

8

Worker Trip Length (miles) (provided by CalEEMod)

10.8

Therefore:

Average Worker Daily VMT:

86

Step 2: Given:

Assumed Fleet Mix for Workers (provided by CalEEMod v2016.3.1)

LDA	LDT1	LDT2
0.3333333	0.333333	0.333333

And:

Gasoline MPG Factors for each Vehicle Class (from EMFAC2014) - Year 2019

LDA	LDT1	LDT2
28.0831	23.4309	20.8105

Therefore:

Weighted Average Worker MPG Factor

24.1

Step 3: **Therefore:**

3.6 **Worker daily gallons of gasoline**

Step 4: 1 **# of Days Assumed for Demolition Phase**

Therefore:

Result: **3.6** **Total gallons of gasoline**

On-road Mobile (Construction) Energy Usage - Site Preparation

Step 1: **Total Daily Worker Trips (provided by CalEEMod)**

18

Worker Trip Length (miles) (provided by CalEEMod)

10.8

Therefore:

Average Worker Daily VMT:

194

Step 2: Given:

Assumed Fleet Mix for Workers (provided by CalEEMod v2016.3.1)

LDA	LDT1	LDT2
0.3333333	0.333333	0.333333

And:

Gasoline MPG Factors for each Vehicle Class (from EMFAC2014) - Year 2019

LDA	LDT1	LDT2
28.0831	23.4309	20.8105

Therefore:

Weighted Average Worker MPG Factor

24.1

Step 3: **Therefore:**

8.1 **Worker daily gallons of gasoline**

Step 4: 26 **# of Days Assumed for Site Preparation Phase**

Therefore:

209.7 **Total gallons of gasoline**

On-road Mobile (Construction) Energy Usage - Grading

Step 1: **Total Daily Worker Trips (provided by CalEEMod)**

30

Worker Trip Length (miles) (provided by CalEEMod)

10.8

Therefore:

Average Worker Daily VMT:

324

Step 2: Given:

Assumed Fleet Mix for Workers (provided by CalEEMod v2016.3.1)

LDA	LDT1	LDT2
0.3333333	0.333333	0.333333

And:

Gasoline MPG Factors for each Vehicle Class (from EMFAC2014) - Year 2019

LDA	LDT1	LDT2
28.0831	23.4309	20.8105

Therefore:

Weighted Average Worker MPG Factor

24.1

Step 3: **Therefore:**

13.4 **Worker daily gallons of gasoline**

Step 4: 100 **# of Days Assumed for Grading Phase**

Therefore:

1343.9 **Total gallons of gasoline**

On-road Mobile (Construction) Energy Usage - Paving

Step 1: **Total Daily Worker Trips (provided by CalEEMod)**

15

Worker Trip Length (miles) (provided by CalEEMod)

10.8

Therefore:

Average Worker Daily VMT:

162

Step 2: Given:

Assumed Fleet Mix for Workers (provided by CalEEMod v2016.3.1)

LDA	LDT1	LDT2
0.3333333	0.333333	0.333333

And:

Gasoline MPG Factors for each Vehicle Class (from EMFAC2014) - Year 2019

LDA	LDT1	LDT2
28.0831	23.4309	20.8105

Therefore:

Weighted Average Worker MPG Factor

24.1

Step 3: **Therefore:**

6.7 **Worker daily gallons of gasoline**

Step 4: 86 **# of Days Assumed for Paving Phase**

Therefore:

577.9 **Total gallons of gasoline**

On-road Mobile (Construction) Energy Usage - Building Construction

Step 1:

Total Daily Worker Trips (provided by CalEEMod)
636

Total Daily Vendor Trips (provided by CalEEMod)
174

Total Daily Hauler Trips (provided by CalEEMod)
0

Worker Trip Length (miles) (provided by CalEEMod)
10.8

Vendor Trip Length (miles) (provided by CalEEMod)
7.3

Hauling Trip Length (miles) (provided by CalEEMod)
0

Therefore:

Average Worker Daily VMT:
6,869

Average Vendor Daily VMT:
1,270

Average Hauling Daily VMT:
-

Step 2:

Given:

Assumed Fleet Mix for Workers (provided by CalEEMod v2016.3.1)

LDA	LDT1	LDT2
0.3333333	0.333333	0.333333

Assumed Fleet Mix for Vendors (provided by CalEEMod v2016.3.1)

MHD	HHD
0.5	0.5

And:

MPG Factors for each Vehicle Class (from EMFAC2014) - Year 2019

Gasoline:

LDA	LDT1	LDT2
28.0831	23.4309	20.8105

Diesel:

MHD	HHD
7.96233788	5.864299

Therefore:

Weighted Average Worker (Gasoline) MPG Factor
24.1

Weighted Average Vendor (Diesel) MPG Factor
6.9

Weighted Average Hauling MPG Factor
0.0

Step 3:

Therefore:
284.9 **Worker daily gallons of gasoline**

Therefore:
183.7 **Vendor daily gallons of diesel**

Therefore:
0.0

Step 4:

920 **# of Days Assumed for Building Construction Phase**

Therefore:
262,122.6 **Total gallons of gasoline**

Therefore:
169,033.7 **Total gallons of diesel**

On-road Mobile (Construction) Energy Usage - Architectural Coating

Step 1: **Total Daily Worker Trips (provided by CalEEMod)**

127

Worker Trip Length (miles) (provided by CalEEMod)

10.8

Therefore:

Average Worker Daily VMT:

1,372

Step 2: Given:

Assumed Fleet Mix for Workers (provided by CalEEMod v2016.3.1)

LDA	LDT1	LDT2
0.3333333	0.333333	0.333333

And:

Gasoline MPG Factors for each Vehicle Class (from EMFAC2014) - Year 2019

LDA	LDT1	LDT2
28.0831	23.4309	20.8105

Therefore:

Weighted Average Worker MPG Factor

24.1

Step 3: **Therefore:**

56.9 **Worker daily gallons of gasoline**

Step 4: 920 **# of Days Assumed for Architectural Coating**

Therefore:

52,342.1 **Total gallons of gasoline**

Appendix C

Cultural Resources Information (Confidential)

Appendix D

Noise Report



Oakwood Landing

City of Manteca, California

December 7, 2016

jcb Project # 2016-154

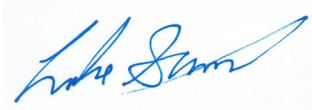
Prepared for:

De Novo Planning Group

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Vice President
Board Certified, Institute of Noise Control Engineering (INCE)

This section provides a general description of the existing noise sources in the Project vicinity, a discussion of the regulatory setting, and identifies potential noise impacts associated with the proposed Project. Project impacts are evaluated relative to applicable noise level criteria and to the existing ambient noise environment. Mitigation measures have been identified for significant noise-related impacts.

3.11.1 ENVIRONMENTAL SETTING

KEY TERMS

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given area consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of noise.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, defined as ten times the logarithm of the ratio of the sound pressure squared over the reference pressure squared.
CNEL	Community noise equivalent level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic acoustic signal, expressed in cycles per second or Hertz.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
L_{dn}	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
L_{eq}	Equivalent or energy-averaged sound level.
L_{max}	The highest root-mean-square (RMS) sound level measured over a given period of time.
$L_{(n)}$	The sound level exceeded a described percentile over a measurement period. For instance, an hourly L_{50} is the sound level exceeded 50 percent of the time during the one hour period.
Loudness	A subjective term for the sensation of the magnitude of sound.
Noise	Unwanted sound.
SEL	Sound exposure levels. A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy into a one-second event.

FUNDAMENTALS OF ACOUSTICS

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second or Hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals), as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels, but are expressed as dB, unless otherwise noted.

The decibel scale is logarithmic, not linear. In other words, two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70 dBA sound is half as loud as an 80 dBA sound, and twice as loud as a 60 dBA sound.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptor, L_{dn}, and shows very good correlation with community response to noise.

The day/night average level (L_{dn}) is based upon the average noise level over a 24-hour day, with a +10 decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-

hour average, it tends to disguise short-term variations in the noise environment. CNEL is similar to L_{dn}, but includes a +5 dB penalty for evening noise. Table 3.11-1 lists several examples of the noise levels associated with common situations.

TABLE 3.11-1: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	*NOISE LEVEL (DBA)*	*COMMON INDOOR ACTIVITIES*
	--110--	Rock Band
Jet Fly-over at 300 m (1,000 ft)	--100--	
Gas Lawn Mower at 1 m (3 ft)	--90--	
Diesel Truck at 15 m (50 ft), at 80 km/hr (50 mph)	--80--	Food Blender at 1 m (3 ft) Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft)	--70--	Vacuum Cleaner at 3 m (10 ft)
Commercial Area Heavy Traffic at 90 m (300 ft)	--60--	Normal Speech at 1 m (3 ft)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing

SOURCE: CALTRANS, TECHNICAL NOISE SUPPLEMENT, TRAFFIC NOISE ANALYSIS PROTOCOL. SEPTEMBER 2013.

EFFECTS OF NOISE ON PEOPLE

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction;
- Interference with activities such as speech, sleep, and learning; and
- Physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so-called ambient noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a 1 dBA change cannot be perceived;
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference;

- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10 dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

Stationary point sources of noise – including stationary mobile sources such as idling vehicles – attenuate (lessen) at a rate of approximately 6 dB per doubling of distance from the source, depending on environmental conditions (i.e. atmospheric conditions and either vegetative or manufactured noise barriers, etc.). Widely distributed noises, such as a large industrial facility spread over many acres, or a street with moving vehicles, would typically attenuate at a lower rate.

EXISTING NOISE LEVELS

Existing and Surrounding Land Uses

The Project site has some existing improvements including an existing barn area with associated equipment, dirt and paved roadways, and irrigation ditches. The majority of the Project site is in active agricultural use. The barn structure is located in the central portion of the Project site. Additionally, Woodward Avenue traverses the center of the Project site from east to west, and McKinley Avenue traverses the northern portion of the Project site from north to south. Figure 2.0-5 shows aerial imagery of the existing site uses within the Project site.

Uses immediately adjacent to the east, south, and west of the Project site include agricultural and residential uses, including ranchettes and large estates lots. Other existing uses east of the northerly portion of the Project site include a single family residential subdivision west of South Airport Way. Existing and future residential subdivisions also exist to the west of the Project site. Other nearby uses includes rural residential uses north of the Project site and south of State Route (SR) 120.

Existing Ambient Noise Levels

To quantify the existing ambient noise environment in the Project vicinity, short-term and continuous (24-hour) noise level measurements were conducted on the Project site on May 24 and 25, 2016. The noise measurement locations are shown on Figure 3.11-1. The noise level measurement survey results are provided in Table 3.11-2. Appendix A of Appendix F shows the complete results of the noise monitoring survey.

The sound level meters were programmed to collect hourly noise level intervals at each site during the survey. The maximum value (L_{max}) represents the highest noise level measured during an interval. The average value (L_{eq}) represents the energy average of all of the noise measured during an interval. The median value (L_{50}) represents the sound level exceeded 50 percent of the time during an interval.

TABLE 3.11-2: SUMMARY OF EXISTING BACKGROUND NOISE MEASUREMENT DATA

SITE	LOCATION	L_{DN}	AVERAGE MEASURED HOURLY NOISE LEVELS, dB					
			DAYTIME (7AM-10PM)			NIGHTTIME (10PM-7AM)		
			L_{EQ}	L_{50}	L_{MAX}	L_{EQ}	L_{50}	L_{MAX}
Continuous (24-hour) Noise Level Measurements								
A	North border of site	66	61	60	73	60	58	71
Short-Term Noise Level Measurements								
1	Northeast border of site	NA	49	48	65	1:24 pm. – Roadway traffic		
2	Southeast border of site	NA	51	48	65	3:18 pm. – Roadway traffic, wind, farming machinery		
3	Southwest border of site	NA	62	50	78	1:52 pm. – Roadway traffic		
4	Northwest border of site	NA	56	50	73	2:55 pm. – Roadway traffic and wind.		

NOTE: SOURCE: J.C. BRENNAN & ASSOCIATES, INC., 2016.

Larson Davis Laboratories (LDL) Model 820 and 824 precision integrating sound level meters were used for the ambient noise level measurement survey. The meters were calibrated before and after use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4).

EXISTING ROADWAY NOISE LEVELS

To predict existing noise levels due to traffic, the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used. The model is based upon the Calveno reference noise emission factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The FHWA model was developed to predict hourly L_{eq} values for free-flowing traffic conditions.

Traffic volumes for existing conditions were obtained from the Traffic Data prepared for the Project (Fehr & Peers). Truck percentages and vehicle speeds on the local area roadways were estimated from field observations.

Traffic noise levels are predicted at the sensitive receptors located at the closest typical setback distance along each Project-area roadway segment. Where traffic noise barriers are predominately along a roadway segment, a -5 offset was added to the noise prediction model to account for various noise barrier heights. A -5 to dB offset was also applied where outdoor activity areas are shielded by intervening buildings. In some locations, sensitive receptors may be located at distances which vary from the assumed calculation distance and may experience shielding from intervening barriers or sound walls. However, the traffic noise analysis is believed to be

representative of the majority of sensitive receptors located closest to the Project-area roadway segments analyzed in this report.

Table 3.11-3 shows the existing traffic noise levels in terms of L_{dn} at closest sensitive receptors along each roadway segment. A complete listing of the FHWA Model input data is contained in Appendix B of Appendix F.

TABLE 3.11-3: EXISTING TRAFFIC NOISE LEVELS AND DISTANCES TO CONTOURS

ROADWAY	*SEGMENT*	*EXTERIOR TRAFFIC NOISE LEVEL, DB L_{DN}*
Airport Way	N. of Yosemite	65.6
Airport Way	Yosemite Ave to Daniels	67.9
Airport Way	Atherton to Woodward	62.6
Airport Way	South of Woodward	58.4
McKinley Ave.	Yosemite to Bronzan	62.8
Union Road	North of SR 120	63.9
Union Road	Atherton to Woodward	54.6
Union Road	South of Woodward	59.9
Woodward Ave.	W. of McKinley	46.3
Woodward Ave.	McKinley Ave to Airport	55.6
Woodward Ave.	Airport to Union	60.1
Woodward Ave.	East of Union	60.4
Yosemite Ave.	W. of McKinley	60.1
Yosemite Ave.	McKinley to Airport	61.9
Yosemite Ave.	Airport Way to Union	67.8

SOURCE: FHWA-RD-77-108 WITH INPUTS FROM FEHR & PEERS, AND J.C. BRENNAN & ASSOCIATES, INC. 2016.

3.11.2 REGULATORY SETTING

FEDERAL

There are no federal regulations related to noise that apply to the proposed Project.

STATE

California Environmental Quality Act

The California Environmental Quality Act (CEQA) Guidelines, Appendix G, indicate that a significant noise impact may occur if a project exposes persons to noise or vibration levels in excess of local general plans or noise ordinance standards, or cause a substantial permanent or temporary increase in ambient noise levels. CEQA standards are discussed more below under the Thresholds of Significance section.

California State Building Codes

The State Building Code, Title 24, Part 2 of the State of California Code of Regulations establishes uniform minimum noise insulation performance standards to protect persons within new buildings which house people, including hotels, motels, dormitories, apartment houses and dwellings other than single-family dwellings. Title 24 mandates that interior noise levels attributable to exterior sources shall not exceed 45 dB L_{dn} or CNEL in any habitable room.

Title 24 also mandates that for structures containing noise-sensitive uses to be located where the L_{dn} or CNEL exceeds 60 dB, an acoustical analysis must be prepared to identify mechanisms for limiting exterior noise to the prescribed allowable interior levels. If the interior allowable noise levels are met by requiring that windows be kept closed, the design for the structure must also specify a ventilation or air conditioning system to provide a habitable interior environment

CITY OF MANTECA

The City of Manteca General Plan

The City of Manteca General Plan Noise Element contains goals, policies, and implementation measures for assessing noise impacts within the City. Listed below are the noise goals, policies, and implementation measures that are applicable to the proposed Project (City of Manteca as amended through 2016):

GOALS: NOISE

- N-1. Protect the residents of Manteca from the harmful and annoying effects of exposure to excessive noise.
- N-3. Ensure that the downtown core noise levels remain acceptable and compatible with commercial and higher density residential land uses.
- N-4. Protect public health and welfare by eliminating existing noise problems where feasible, by establishing standards for acceptable indoor and outdoor noise, and by preventing significant increases in noise levels.
- N-5. Incorporate noise considerations into land use planning decisions, and guide the location and design of transportation facilities to minimize the effects of noise on adjacent land uses.

POLICIES: NOISE

- N-P-2. New development of residential or other noise-sensitive land uses will not be permitted in noise-impacted areas unless effective mitigation measures are incorporated into the project design to satisfy the performance standards in Table 9-1 [Table 3.11-4].

TABLE 3.11-4: MAXIMUM ALLOWABLE NOISE EXPOSURE MOBILE NOISE SOURCES

LAND USE[4]	*OUTDOOR ACTIVITY AREAS*[1]	*INTERIOR SPACES*	
		L_{DN}/CNEL, *DB*	L_{EQ}/CNEL, *DB*[3]

LAND USE[4]	*OUTDOOR ACTIVITY AREAS*[1]	*INTERIOR SPACES*	
		L_{DN}/CNEL, dB	L_{EQ}/CNEL, dB[3]
Residential	60[2]	45	--
Transient Lodging	60[2]	45	--
Hospitals, Nursing Homes	60[2]	45	--
Theatres, Auditoriums, Music Halls	--	--	35
Churches, Music Halls	60[2]	--	40
Office Buildings	65	--	45
Schools, Libraries, Museums	--	--	45
Playgrounds, Neighborhood Parks	70	--	--

NOTES: [1] OUTDOOR ACTIVITY AREAS FOR RESIDENTIAL DEVELOPMENT ARE CONSIDERED TO BE BACKYARD PATIOS OR DECKS OF SINGLE FAMILY DWELLINGS, AND THE COMMON AREAS WHERE PEOPLE GENERALLY CONGREGATE FOR MULTI-FAMILY DEVELOPMENTS. OUTDOOR ACTIVITY AREAS FOR NON-RESIDENTIAL DEVELOPMENTS ARE CONSIDERED TO BE THOSE COMMON AREAS WHERE PEOPLE GENERALLY CONGREGATE, INCLUDING PEDESTRIAN PLAZAS, SEATING AREAS, AND OUTSIDE LUNCH FACILITIES. WHERE THE LOCATION OF OUTDOOR ACTIVITY AREAS IS UNKNOWN, THE EXTERIOR NOISE LEVEL STANDARD SHALL BE APPLIED TO THE PROPERTY LINE OF THE RECEIVING LAND USE.

[2] IN AREAS WHERE IT IS NOT POSSIBLE TO REDUCE EXTERIOR NOISE LEVELS TO 60 DB L_{DN} OR BELOW USING A PRACTICAL APPLICATION OF THE BEST NOISE-REDUCTION TECHNOLOGY, AN EXTERIOR NOISE LEVEL OF UP TO 65 L_{DN} WILL BE ALLOWED.

[3] DETERMINED FOR A TYPICAL WORST-CASE HOUR DURING PERIODS OF USE.

[4] WHERE A PROPOSED USE IS NOT SPECIFICALLY LISTED ON THE TABLE, THE USE SHALL COMPLY WITH THE NOISE EXPOSURE STANDARDS FOR THE NEAREST SIMILAR USE AS DETERMINED BY THE CITY.

SOURCE: CITY OF MANTECA GENERAL PLAN, NOISE ELEMENT, TABLE 9-1.

- N-P-3. The City may permit the development of new noise-sensitive uses only where the noise level due to fixed (non-transportation) noise sources satisfies the noise level standards of Table 9-2 [Table 3.11-5]. Noise mitigation may be required to meet Table 9-2 [Table 3.11-5] performance standards.

TABLE 3.11-5: PERFORMANCE STANDARDS FOR STATIONARY NOISE SOURCES OR PROJECTS AFFECTED BY STATIONARY NOISE SOURCES [1,2]

NOISE LEVEL DESCRIPTOR	*DAYTIME (7 AM – 10 PM)*	*NIGHTTIME (10 PM – 7 AM)*
Hourly L_{eq}, dB	50	45
Maximum Level, dB	70	65

NOTES: [1] EACH OF THE NOISE LEVELS SPECIFIED ABOVE SHOULD BE LOWERED BY FIVE (5) DB FOR SIMPLE NOISE TONES, NOISES CONSISTING PRIMARILY OF SPEECH OR MUSIC, OR RECURRING IMPULSIVE NOISES. SUCH NOISES ARE GENERALLY CONSIDERED BY RESIDENTS TO BE PARTICULARLY ANNOYING AND ARE A PRIMARY SOURCE OF NOISE COMPLAINTS.

[2] NO STANDARDS HAVE BEEN INCLUDED FOR INTERIOR NOISE LEVELS. STANDARD CONSTRUCTION PRACTICES SHOULD, WITH THE EXTERIOR NOISE LEVELS IDENTIFIED, RESULT IN ACCEPTABLE INTERIOR NOISE LEVELS.

SOURCE: CITY OF MANTECA GENERAL PLAN, NOISE ELEMENT, TABLE 9-1.

- N-P-5. In accord with the Table 9-2 [Table 3.11-5] standards, the City shall regulate construction-related noise impacts on adjacent uses.

IMPLEMENTATION MEASURES: NOISE

- N-I-1. New development in residential areas with an actual or projected exterior noise level of greater than 60 dB L_{dn} will be conditioned to use mitigation measures to reduce exterior noise levels to less than or equal to 60 dB L_{dn}.
- N-I-3. In making a determination of impact under the California Environmental Quality Act (CEQA), a substantial increase will occur if ambient noise levels are increased by 10 dB or more. An increase from 5-10 dB may be substantial. Factors to be considered in determining the significance of increases from 5-10 dB include:
    - the resulting noise levels
    - the duration and frequency of the noise
    - the number of people affected
    - the land use designation of the affected receptor sites
    - public reactions or controversy as demonstrated at workshops or hearings, or by correspondence
    - prior CEQA determinations by other agencies specific to the project
- N-I-4. Control noise at the source through use of insulation, berms, building design and orientation, buffer space, staggered operating hours and other techniques. Use noise barriers to attenuate noise to acceptable levels.

City of Manteca Municipal Code Noise Ordinance

Section 9.52.030 of the City of Manteca Municipal Code prohibits excessive or annoying noise or vibration to residential and commercial properties in the City. The following general rules are outline in the ordinance:

9.52.030 PROHIBITED NOISES—GENERAL STANDARD

No person shall make, or cause to suffer, or permit to be made upon any public property, public right-of-way or private property, any unnecessary and unreasonable noises, sounds or vibrations which are physically annoying to reasonable persons of ordinary sensitivity or which are so harsh or so prolonged or unnatural or unusual in their use, time or place as to cause or contribute to the unnecessary and unreasonable discomfort of any persons within the neighborhood from which said noises emanate or which interfere with the peace and comfort of residents or their guests, or the operators or customers in places of business in the vicinity, or which may detrimentally or adversely affect such residences or places of business. (Ord. 1374 § 1(part), 2007)

17.58.050 D. EXEMPT ACTIVITIES

8. Construction activities when conducted as part of an approved Building Permit, except as prohibited in Subsection 17.58.050(E)(1) (Prohibited Activities) below.

17.58.050 E. PROHIBITED ACTIVITIES

1. Construction Noise. Operating or causing the operation of tools or equipment on private property used in alteration, construction, demolition, drilling, or repair work daily between the hours of 7:00 p.m. and 7:00 a.m., so that the sound creates a noise disturbance across a residential property line, except for emergency work of public service utilities.

VIBRATION STANDARDS

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that in that noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of an amplitude and frequency. A person's perception to the vibration will depend on their individual sensitivity to vibration, as well as the amplitude and frequency of the source and the response of the system which is vibrating.

Vibration can be measured in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities in inches per second. Standards pertaining to perception as well as damage to structures have been developed for vibration levels defined in terms of peak particle velocities.

The City of Manteca does not have specific policies pertaining to vibration levels. However, vibration levels associated with construction activities and railroad operations are addressed as potential noise impacts associated with Project implementation.

Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. Table 3.11-6 indicates that the threshold for damage to structures ranges from 0.2 to 0.6 peak particle velocity in inches per second (in/sec p.p.v). One-half this minimum threshold or 0.1 in/sec p.p.v. is considered a safe criterion that would protect against architectural or structural damage. The general threshold at which human annoyance could occur is noted as 0.1 in/sec p.p.v.

TABLE 3.11-6: EFFECTS OF VIBRATION ON PEOPLE AND BUILDINGS

PEAK PARTICLE VELOCITY		HUMAN REACTION	EFFECT ON BUILDINGS
MM/SEC.	IN./SEC.		
0.15-0.30	0.006-0.019	Threshold of perception; possibility of intrusion	Vibrations unlikely to cause damage of any type
2.0	0.08	Vibrations readily perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
2.5	0.10	Level at which continuous vibrations begin to annoy people	Virtually no risk of "architectural" damage to normal buildings
5.0	0.20	Vibrations annoying to people in buildings (this agrees with the levels established for people standing on bridges and subjected to relative short periods of vibrations)	Threshold at which there is a risk of "architectural" damage to normal dwelling - houses with plastered walls and ceilings. Special types of finish such as lining of walls, flexible ceiling treatment, etc., would minimize "architectural" damage
10-15	0.4-0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage.

SOURCE: CALTRANS. TRANSPORTATION RELATED EARTHBORN VIBRATIONS. TAV-02-01-R9601 FEBRUARY 20, 2002.

3.11.3 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the Project will have a significant impact related to noise if it will result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- A substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project;
- A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without Project;
- For a Project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the Project area to excessive noise levels within two miles of a public airport or public use airport; or
- For a Project within the vicinity of a private airstrip, expose people residing or working in the Project area to excessive noise levels.

The Project site is not located within two miles of a public or private airport or airstrip. Therefore, airport and airport noise is not discussed further in this analysis.

Determination of a Significant Increase in Noise Levels

The CEQA guidelines define a significant impact of a project if it "increases substantially the ambient noise levels for adjoining areas". Implementation Measure N-I-3 of the City of Manteca General Plan Noise Element provides specific guidance for assessing increases in ambient noise, as follows:

> *In making a determination of impact under the California Environmental Quality Act (CEQA), a substantial increase will occur if ambient noise levels are increased by 10 dB or more. An increase from 5-10 dB may be substantial. Factors to be considered in determining the significance of increases from 5-10 dB include:*
>
> - *the resulting noise levels*
> - *the duration and frequency of the noise*
> - *the number of people affected*
> - *the land use designation of the affected receptor sites*
> - *public reactions/controversy as demonstrated at workshops/hearings, or by correspondence*
> - *prior CEQA determinations by other agencies specific to the project*
> - *The proposed project is not located within two miles of an airport. Therefore, aircraft noise is not examined further in this report.*

IMPACTS AND MITIGATION MEASURES

Impact 3.11-1: The proposed Project has the potential to increase traffic noise levels at existing receptors. (Less than Significant)

PROPOSED PROJECT ANALYSIS

Table 3.11-7 shows the predicted traffic noise level increases on the local roadway network for Existing No Project, Existing + Project, Cumulative, and Cumulative No Project conditions. Appendix B of Appendix F provides the complete inputs and results of the FHWA traffic noise modeling.

Some noise sensitive receptors located along the Project-area roadways are currently exposed to exterior traffic noise levels exceeding the City of Manteca 60 dB L_{dn} exterior noise level standard for residential uses, as shown in Table 3.11-7. As shown by Table 3.11-7, these receptors will continue to experience elevated exterior noise levels with implementation of the proposed Project. The proposed Project's contribution to traffic noise increases is predicted to be 5.3 dBA L_{dn}, or less. This complies with the City's substantial increase criteria of 5 to 10 dB.

TABLE 3.11-7: EXISTING AND CUMULATIVE TRAFFIC NOISE LEVELS

ROADWAY	SEGMENT	NOISE LEVELS (L_{DN}, dB) AT NEAREST SENSITIVE RECEPTORS					
		EXISTING	EXISTING + PROJECT	CHANGE	CUMULATIVE	CUMULATIVE + PROJECT	CHANGE
Airport Way	N. of Yosemite	65.6	65.7	0.1	68.3	68.4	0.1
Airport Way	Yosemite Ave to Daniels	67.9	68.0	0.1	69.9	70.0	0.1
Airport Way	Atherton to Woodward	62.6	64.7	2.1	65.5	66.0	0.5
Airport Way	South of Woodward	58.4	58.5	0.1	61.7	61.7	0.0
McKinley Ave.	Yosemite to Bronzan	62.8	68.2	5.3	68.3	68.6	0.3
Union Road	North of SR 120	63.9	64.1	0.2	65.7	65.7	0.1
Union Road	Atherton to Woodward	54.6	55.4	0.8	59.1	59.3	0.2
Union Road	South of Woodward	59.9	60.0	0.1	63.8	63.8	0.0
Woodward Ave.	W. of McKinley	46.3	50.1	3.7	46.6	50.2	3.5
Woodward Ave.	McKinley Ave to Airport	55.6	59.7	4.1	61.1	61.9	0.8
Woodward Ave.	Airport to Union	60.1	62.7	2.6	63.6	64.6	1.0
Woodward Ave.	East of Union	60.4	60.6	0.3	62.8	62.8	0.0
Yosemite Ave.	W. of McKinley	60.1	62.4	2.4	61.5	61.5	0.0
Yosemite Ave.	McKinley to Airport	61.9	62.1	0.2	64.1	64.3	0.1
Yosemite Ave.	Airport Way to Union	67.8	67.9	0.1	69.3	69.4	0.1

SOURCE: J.C. BRENNAN & ASSOCIATES, INC. 2016.

CONCLUSION

The proposed Project would not cause increased noise levels exceeding the City of Manteca 60 dB L_{dn} exterior noise level standard at existing residential receptors. Therefore, this would be a **less-than-significant** impact relative to the CEQA checklist threshold (a). Additionally, traffic noise level increases would not exceed the City's CEQA substantial increase criteria of 5 to 10 dB. Therefore, this would be a **less-than-significant** impact relative to the CEQA checklist threshold (b).

Impact 3.11-2: The proposed Project has the potential to increase noise levels associated with construction activities. (Less than Significant with Mitigation)

During the construction of the Project including roads, water, and sewer lines and related infrastructure, noise from construction activities would add to the noise environment in the Project vicinity. Activities involved in construction would generate maximum noise levels, as indicated in Table 3.11-8, ranging from 76 to 90 dB at a distance of 50 feet. Construction activities would be temporary in nature and are anticipated to occur during normal daytime working hours.

TABLE 3.11-8: CONSTRUCTION EQUIPMENT NOISE

TYPE OF EQUIPMENT	*MAXIMUM LEVEL, DB AT 50 FEET*
Backhoe	78
Compactor	83
Compressor (air)	78
Concrete Saw	90
Dozer	82
Dump Truck	76
Excavator	81
Generator	81
Jackhammer	89
Pneumatic Tools	85

SOURCE: ROADWAY CONSTRUCTION NOISE MODEL USER'S GUIDE. FEDERAL HIGHWAY ADMINISTRATION. FHWA-HEP-05-054. JANUARY 2006.

Noise would also be generated during the construction phase by increased truck traffic on area roadways. A significant Project-generated noise source would be truck traffic associated with transport of heavy materials and equipment to and from construction sites. This noise increase would be of short duration, and would likely occur primarily during daytime hours.

Construction activities would be temporary in nature and are exempt from noise regulation during the hours of 7:00 AM to 7:00 PM, as outlined in the City's Municipal Code:

17.58.050 D. Exempt Activities

8. Construction activities when conducted as part of an approved Building Permit, except as prohibited in Subsection 17.58.050(E)(1) (Prohibited Activities) below.

17.58.050 E. Prohibited Activities

1. Construction Noise. Operating or causing the operation of tools or equipment on private property used in alteration, construction, demolition, drilling, or repair work daily between the hours of 7:00 p.m. and 7:00 a.m., so that the sound creates a noise disturbance across a residential property line, except for emergency work of public service utilities.

Implementation of the following mitigation measures will ensure that these potential impacts are reduced to a **less-than-significant** level.

MITIGATION MEASURE(S)

Mitigation Measure 3.11-1: *Construction activities shall adhere to the requirements of the City of Manteca Municipal Code with respect to hours of operation. This requirement shall be noted in the improvements plans prior to approval by the City's Public Works Department.*

Mitigation Measure 3.11-2: *All equipment shall be fitted with factory equipped mufflers, and in good working order. This requirement shall be noted in the improvements plans prior to approval by the City's Public Works Department.*

Impact 3.11-3: The proposed Project has the potential to increase noise vibration association with construction activities. (Less than Significant)

The primary vibration-generating activities associated with the proposed Project would occur during construction when activities such as grading, utilities placement, and parking lot construction occur. Sensitive receptors which could be impacted by construction-related vibrations, especially vibratory compactors/rollers, are located approximately 100 feet or further from the Project area. At this distance, construction vibrations are not predicted to exceed acceptable levels. Additionally, construction activities would be temporary in nature and would likely occur during normal daytime working hours.

Construction vibration impacts include human annoyance and building structural damage. Human annoyance occurs when construction vibration rises significantly above the threshold of perception. Building damage can take the form of cosmetic or structural. Table 3.11-9 shows the typical vibration levels produced by construction equipment.

TABLE 3.11-9: VIBRATION LEVELS FOR VARYING CONSTRUCTION EQUIPMENT

TYPE OF EQUIPMENT	*PEAK PARTICLE VELOCITY @ 25 FEET (INCHES/SECOND)*	*PEAK PARTICLE VELOCITY @ 100 FEET (INCHES/SECOND)*
Large Bulldozer	0.089	0.011
Loaded Trucks	0.076	0.010
Small Bulldozer	0.003	0.000
Auger/drill Rigs	0.089	0.011
Jackhammer	0.035	0.004
Vibratory Hammer	0.070	0.009
Vibratory Compactor/roller	0.210	0.026

SOURCE: FEDERAL TRANSIT ADMINISTRATION, TRANSIT NOISE AND VIBRATION IMPACT ASSESSMENT GUIDELINES, MAY 2006

Table 3.11-9 data indicate that construction vibration levels anticipated for the Project are less than the 0.1 in/sec criteria at distances of 50 feet. Therefore, construction vibrations are not predicted to cause damage to existing buildings or cause annoyance to sensitive receptors. Implementation of the proposed Project would have a **less than significant** impact relative to this environmental topic.

Impact 3.11-4: The proposed Project has the potential to expose new sensitive receptors to excessive transportation noise. (Less than Significant with Mitigation)

The FHWA traffic noise prediction model was used to predict Cumulative + Project traffic noise levels at the proposed residential land uses associated with the Project. Table 3.11-10 shows the predicted traffic noise levels at the proposed residential uses adjacent to the major Project-area arterial roadways. Table 3.11-10 also indicates the property line noise barrier heights required to achieve compliance with an exterior noise level standard of 60 dB L_{dn}.

The complete inputs and results to the FHWA traffic noise prediction model and barrier calculations are contained in the Noise Study Appendix C (see Appendix F of this EIR). The modeled noise barriers assume flat site conditions where roadway elevations, base of wall elevations, and building pad elevations are approximately equivalent.

To describe future noise levels due to traffic, FHWA Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used. Direct inputs to the model included traffic volumes provided by Fehr & Peers. The FHWA model is based upon the Calveno reference noise factors for automobiles, medium trucks and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The FHWA model was developed to predict hourly L_{eq} values for free-flowing traffic conditions. To predict L_{dn}/CNEL values, it is necessary to determine the day/night distribution of traffic and adjust the traffic volume input data to yield an equivalent hourly traffic volume.

TABLE 3.11-10: CUMULATIVE + PROJECT TRANSPORTATION NOISE LEVELS AT PROPOSED RESIDENTIAL USES

ROADWAY	APPROXIMATE RESIDENTIAL SETBACK, FEET[1]	ADT	PREDICTED TRAFFIC NOISE LEVELS, DB L_{DN}[2]					
			NO WALL	6' WALL	7' WALL	8' WALL	9' WALL	10' WALL
SR 120 - Residential East of McKinley	400'	130,200	72	67	66	64	63	62
Atherton - Residential west of McKinley	65'	21,660	69	63	61	60	59	58
McKinley - Residential south of Atherton	65'	16,190	68	62	60	59	58	57
Woodward - Residential west of McKinley	65'	6,990	64	58	57	55	54	53

NOTES: ADT = AVERAGE DAILY TRIPS

[1] SETBACK DISTANCES ARE MEASURED IN FEET FROM THE CENTERLINES OF THE ROADWAYS TO THE CENTER OF RESIDENTIAL BACKYARDS.

[2] THE MODELED NOISE BARRIERS ASSUME FLAT SITE CONDITIONS WHERE ROADWAY ELEVATIONS, BASE OF WALL ELEVATIONS, AND BUILDING PAD ELEVATIONS ARE APPROXIMATELY EQUIVALENT.

SOURCE: FHWA-RD-77-108 WITH INPUTS FROM FEHR & PEERS, AND J.C. BRENNAN & ASSOCIATES, INC. 2016.

Table 3.11-10 data indicate that noise barriers 6- to 8-feet in height would generally be sufficient to achieve compliance with the City of Manteca 60 dB L_{dn} exterior noise level standard for the proposed residential uses. However, for the residential uses located at the northeast corner of the project site, a sound walls of 8 to 10-feet in height would only reduce exterior noise levels to 62-64 dB L_{dn}. While these noise level do not meet the City's preferred 60 dB L_{dn} noise standards, they would comply with the City's conditionally acceptable standard of 65 dB L_{dn} where practical noise control measures cannot achieve 60 dB L_{dn}. Generally, sound walls exceeding 10-feet in height are not desirable in close proximity to residential uses.

INTERIOR NOISE IMPACTS

Modern construction typically provides a 25 dB exterior-to-interior noise level reduction with windows closed. Therefore, sensitive receptors exposed to exterior noise of 70 dB L_{dn}, or less, will typically comply with the City of Manteca 45 dB L_{dn} interior noise level standard. Additional noise reduction measures, such as acoustically-rated windows, are generally required for exterior noise levels exceeding 70 dB L_{dn}.

It should be noted that exterior noise levels are typically 2 to 3 dB higher at second floor locations. Additionally, noise barriers do not reduce exterior noise levels at second floor locations. The proposed residential uses are predicted to be exposed to unmitigated first floor exterior transportation noise levels ranging between 64 to 72 dB L_{dn}. Therefore, second floor facades are predicted to be exposed to exterior noise levels of up to 66 to 75 dB L_{dn}.

Based upon a 25 dB exterior-to-interior noise level reduction, interior noise levels are predicted to range between 41 to 50 dB L_{dn}. Predicted interior noise levels would exceed the City's 45 dB L_{dn} interior noise level standard at the first row of residential uses located closest to SR-120, along

Atherton Drive. Therefore, additional interior noise control measures would be required for these residential uses. In order to reduce interior noise levels to 45 dB L_{dn}, or less, it is likely that second floor facades would require windows having a Sound Transmission Class (STC) 36, or higher. Exterior walls would also likely require 3-coat stucco and RC-channels. This would specifically apply to the first row of homes along Atherton Drive, within 800-feet of the centerline of SR-120 and does not apply to facades facing away from the roadway.

This analysis assumes that mechanical ventilation will be provided to allow residents to keep doors and windows closed, as desired for acoustical isolation. With implementation of the following interior and exterior mitigation measures, the proposed Project would have a **less-than-significant** impact relative to this environmental topic.

MITIGATION MEASURE(S)

Mitigation Measure 3.11-3: *6- to 10-foot tall sound walls and/or landscaped berms shall be constructed along the primary Project-area roadways, adjacent to proposed residential uses, in order to achieve the City's exterior noise standards. See Table 3.11-10 of Section 3.11 of the Draft EIR for specific noise barrier heights along each roadway. Noise barrier walls shall be constructed of concrete panels, concrete masonry units, earthen berms, or any combination of these materials. Wood is not recommended due to eventual warping and degradation of acoustical performance. These requirements shall be included in the improvements plans prior to their approval by the City's Public Works Department.*

Mitigation Measure 3.11-4: *The first row of residential uses located along SR-120 shall include windows having a Sound Transmission Class (STC) 36, or higher, rating installed in second floor facades. Exterior walls would also likely require 3-coat stucco and RC-channels. This would specifically apply to the first row of homes along Atherton Drive, within 800-feet of the centerline of SR-120 and does not apply to facades facing away from the roadway. A detailed analysis of any additional interior mitigation measures shall be conducted when building plans are available to verify these requirements. This requirement shall be included in the improvements plans prior to approval by the City's Public Works Department.*

Mitigation Measure 3.11-5: *Mechanical ventilation shall be installed in all residential uses to allow residents to keep doors and windows closed, as desired for acoustical isolation. This requirement shall be included in the improvements plans prior to approval by the City's Public Works Department.*

Impact 3.11-5: The proposed Project has the potential to expose sensitive receptors to substantial noise from proposed park uses. (Less than Significant with Mitigation)

Children playing at neighborhood parks or outdoor recreational fields (softball, soccer, basketball, tennis) are often considered potentially significant noise sources which could adversely affect adjacent noise-sensitive land uses. Typical noise levels associated with groups of approximately 50

children playing at a distance of 50 feet generally range from 55 to 60 dB L_{eq} and 70 to 75 dB L_{max}. It is expected that park activities would occur during daytime hours. Therefore, noise levels from the playgrounds would need to comply with the City of Manteca exterior noise level standards of 50 dB L_{eq} and 70 dB L_{max} at the nearest residential uses.

Based upon the reference noise level data discussed above, the 50 dB L_{eq} noise contour would be located approximately 160 feet from the center of playgrounds or recreational fields. The 70 dB L_{max} noise contour would extend approximately 90 feet from the center of playground or recreational fields. For residential backyards located less than 160 feet from the center of a playground or recreational field, noise levels may exceed the City of Manteca 50 dB L_{eq} exterior noise level standard. In this case, construction of a 6-foot tall masonry sound wall would provide an approximate noise level reduction of 5 dB and would typically reduce noise levels to 50 dB L_{eq} and 70 dB L_{max}, or less.

With implementation of the following exterior mitigation measure, the proposed Project would have a **less than significant** impact relative to this environmental topic.

MITIGATION MEASURE(S)

Mitigation Measure 3.11-6: *Minimum 6-foot tall sound walls and/or landscaped berms shall be constructed where a park site abuts a residential use. No wall shall be required where residential uses are fronted towards a park site and separated by a roadway. Noise barrier walls shall be constructed of concrete panels, concrete masonry units, earthen berms, or any combination of these materials. Wood is not recommended due to eventual warping and degradation of acoustical performance. This requirement shall be included in the improvements plans prior to approval by the City's Public Works Department.*

Impact 3.11-6: The proposed Project has the potential to expose sensitive receptors to substantial noise from proposed commercial mixed-uses. (Less than Significant with Mitigation)

COMMERCIAL AND OFFICE LAND USES

Commercial and office land use activities can produce noise levels which affect adjacent sensitive land uses. These noise sources can be continuous and may contain tonal components which may be annoying to individuals who live in the nearby vicinity. In addition, noise generation from fixed noise sources may vary based upon climatic conditions, time of day, and existing ambient noise levels. The primary noise sources generally include truck deliveries, trash pickup, parking lot use, and heating, ventilation, and air conditioning (HVAC) equipment operation. These sources may result in noise levels in excess of the City's standards at nearby receptors.

MECHANICAL EQUIPMENT

Heating, air conditioning, and ventilation equipment can be a primary noise source associated with commercial mixed uses. These types of equipment are often mounted on roof tops, located on the

ground, or located within mechanical rooms. The noise sources can take the form of fans, pumps, air compressors, chillers, or cooling towers. Noise levels from these types of equipment can vary significantly. Noise levels from these types of sources generally range between 45 dB to 70 dB at a distance of 50 feet and could exceed City standards at nearby receptors.

MEASURES TO REDUCE NOISE EXPOSURE

Use of Setbacks: Noise exposure may be reduced by increasing the distance between the noise source and receiving use. Setbacks can take the form of open space, frontage roads, recreational areas, etc. The available noise attenuation from this technique is limited by the characteristics of the noise source, but is generally 3 to 6 dB per doubling of distance from the source. The rule-of-thumb is that most traffic and railroad noise levels will decrease or increase by approximately 4.5 dB per doubling, or halving of distance, respectively. Noise from point sources, such as HVAC equipment, will generally attenuate at 6 dB per doubling of distance.

Use of Barriers: Noise reduction can be accomplished by placing walls, berms or other structures, such as buildings, between the noise source and the receiver. In addition, intervening topography can be an effective barrier for noise control. The effectiveness of a barrier depends upon blocking line-of-sight between the source and receiver, and is improved with increases in distance the sound must travel to pass over the barrier as compared to a straight line from source to receiver. The difference between the distance over a barrier and a straight line between source and receiver is called the "path length difference," and is the basis for calculating barrier noise reduction.

In general, barriers are most effective when placed close to either the receiver or the source. An intermediate barrier location yields a smaller path length difference for a given increase in barrier height than does a location closer to either source or receiver.

Site Design, Building Locations, and Building Orientations: Buildings can be placed on a project site to shield other structures or areas, to remove them from noise-impacted areas, and to prevent an increase in noise levels caused by reflections. As an example, carports or garages can be used to form or complement a barrier, or shield an outdoor activity area. Placement of outdoor activity areas on the opposite side of the building facades from the noise source, or within the shielded portion of a building complex, such as a central courtyard, can also be an effective method of providing a quiet retreat in an otherwise noisy environment.

CONCLUSION

With implementation of the following exterior mitigation measure, the proposed Project would have a **less than significant** impact relative to this environmental topic.

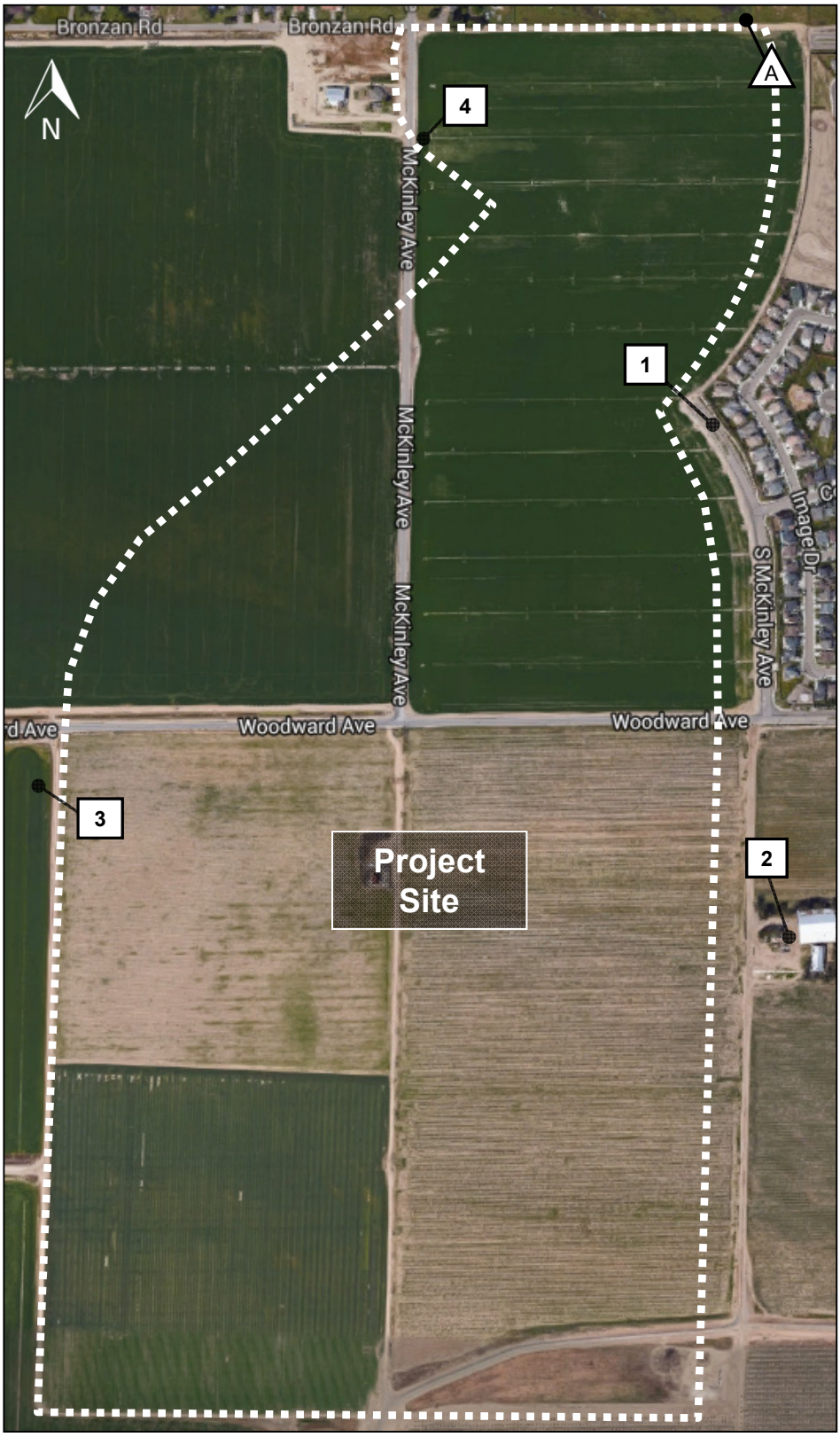
MITIGATION MEASURE(S)

Mitigation Measure 3.11-7: *Where commercial, business professional, office, or similar uses abut residential uses or where loading docks or truck circulation routes face residential areas, the following mitigation measures shall be included in the Project design:*

- *All HVAC equipment shall be located within mechanical rooms where possible or shielded from view with solid barriers;*
- *Emergency generators shall comply with the City's noise criteria at the nearest noise-sensitive receivers;*
- *Delivery/loading activities shall comply with the City of Manteca noise ordinance standards.*
- *The applicant shall submit a noise study to verify that the appropriate noise control measures have been incorporated into the Project design and will achieve compliance with the City's noise level standards.*

These requirements shall be included in the improvements plans prior to their approval by the City's Public Works Department.

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Legend

X : Continuous (24-hr) Noise Measurement Site

:Short-Term Noise Measurement Site

Oakwood Landing
Figure 3.11-1
Noise Measurement Locations

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consultants in acoustics

Figure Prepared:
December 6, 2016

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Appendix A
Oakwood Landing
24hr Continuous Noise Monitoring - Site A
May 24-25, 2016

Hour	Leq	Lmax	L50	L90
15:00:00	60	68	59	56
16:00:00	60	74	59	57
17:00:00	61	69	61	59
18:00:00	64	86	61	59
19:00:00	61	71	60	58
20:00:00	60	68	59	56
21:00:00	60	73	59	56
22:00:00	59	72	58	55
23:00:00	58	72	57	53
0:00:00	57	68	55	51
1:00:00	56	66	54	49
2:00:00	56	68	55	50
3:00:00	59	74	58	54
4:00:00	61	73	60	58
5:00:00	62	76	62	60
6:00:00	62	72	61	59
7:00:00	61	75	60	57
8:00:00	61	71	60	57
9:00:00	61	70	61	57
10:00:00	61	69	60	57
11:00:00	61	71	60	56
12:00:00	61	80	60	57
13:00:00	60	79	59	56
14:00:00	60	75	59	57

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	64	60	61	62	56	60
Lmax (Maximum)	86	68	73	76	66	71
L50 (Median)	61	59	60	62	54	58
L90 (Background)	59	56	57	60	49	54

Computed Ldn, dB	66
% Daytime Energy	69%
% Nighttime Energy	31%

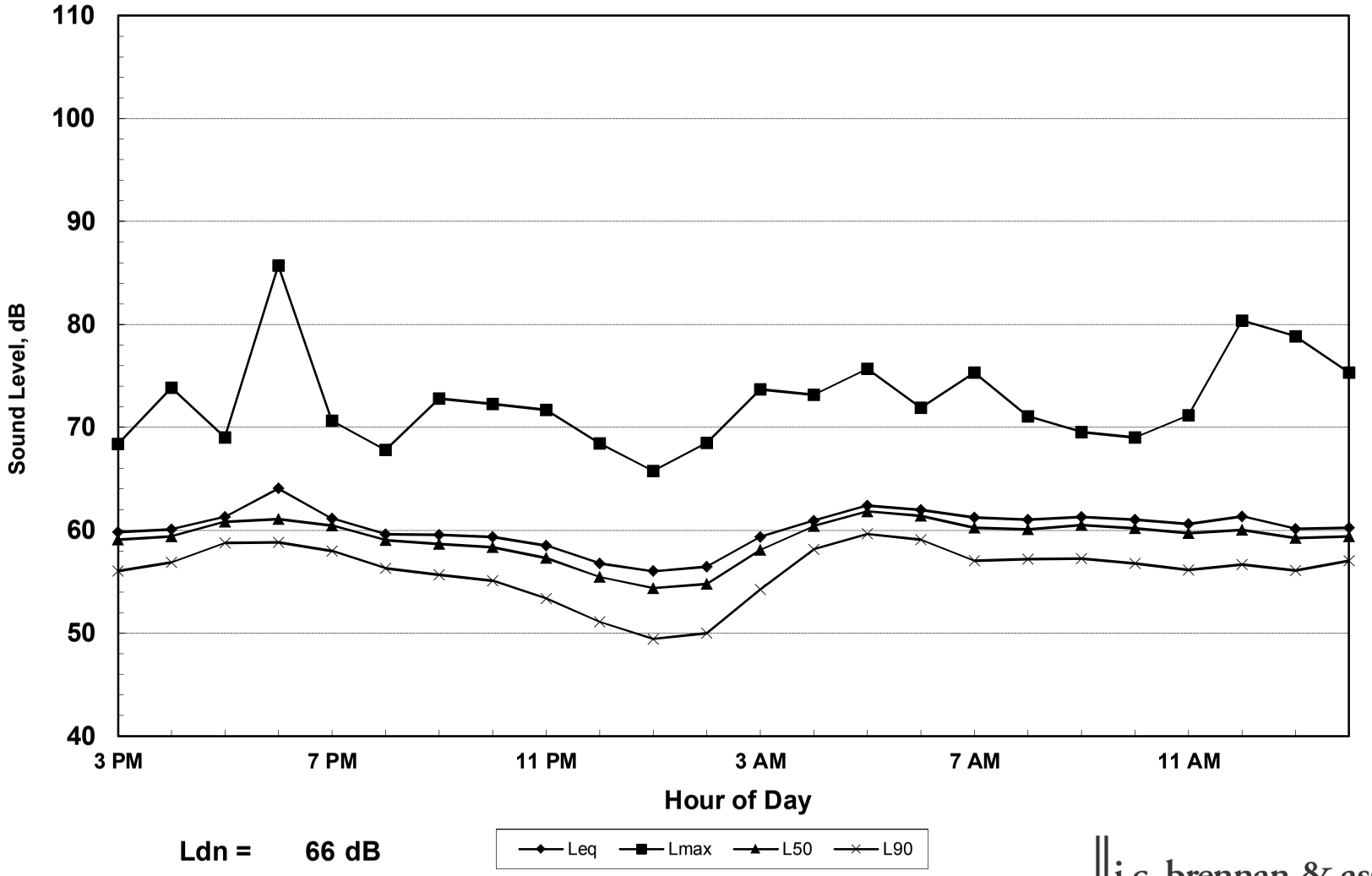
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Appendix A

Oakwood Landing

24hr Continuous Noise Monitoring - Site A

May 24-25, 2016



Ldn = 66 dB

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Appendix A
Short-Term Noise Monitoring Summary

Project: Oakwood Landing
Location: Site 1
Date: 5/24/2016
Time: 1:24 PM
SLM: Larson Davis Model 824-1

Calibrator: LDL CAL 200
Wind Speed: 8 mph
Weather: Clear, dry, 72 F
Field Tech: NTP

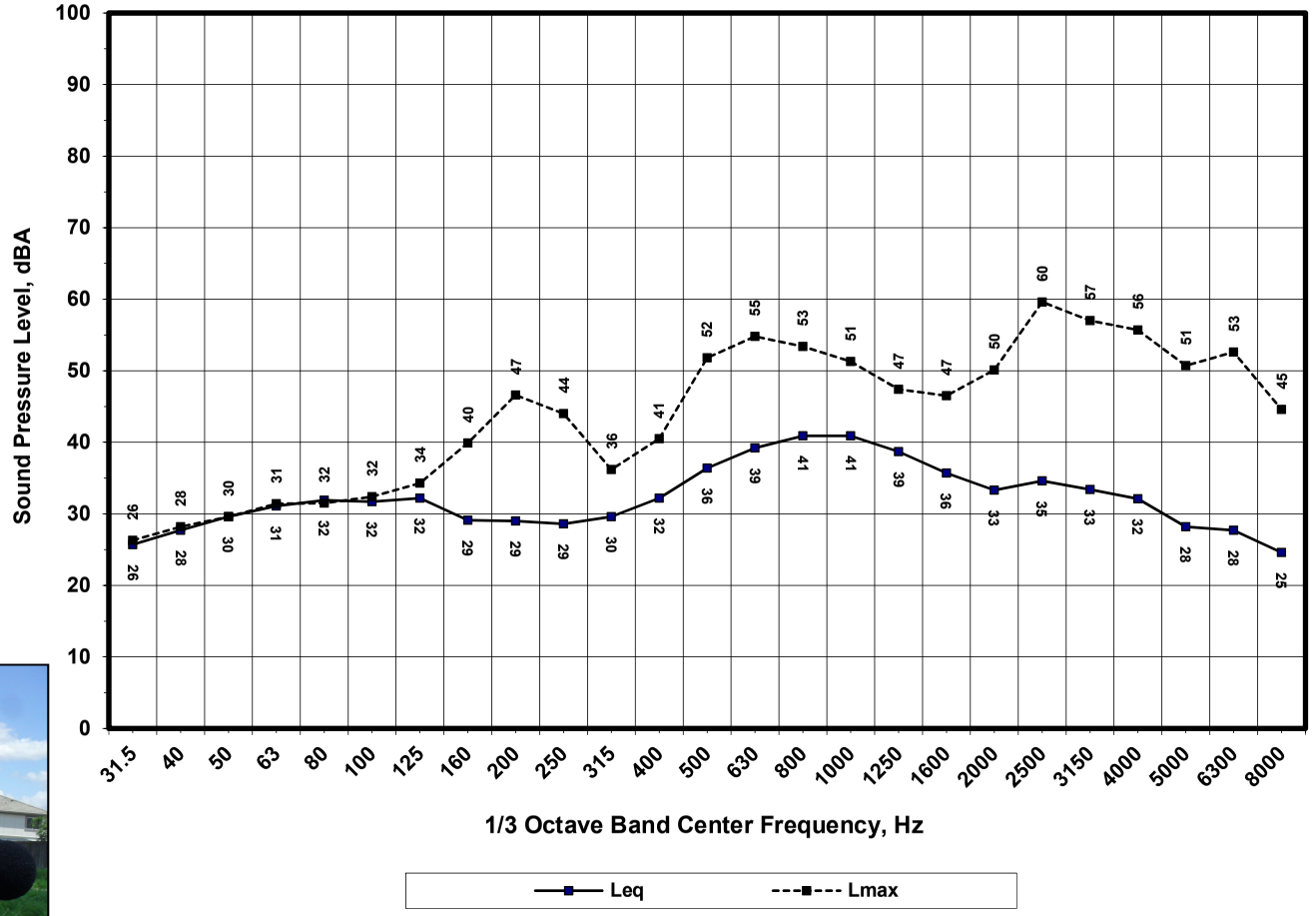
Measurement Results, dBA

Duration:	0:10
L_{eq}:	48.5 dBA
L_{max}:	64.6 dBA
L_{min}:	42.9 dBA
L_{50}:	48
L_{90}:	45

Notes

Traffic from HWY 120 is the primary noise source.





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Appendix A
Short-Term Noise Monitoring Summary

Project: Oakwood Landing
Location: Site 2
Date: 5/24/2016
Time: 3:18 PM
SLM: Larson Davis Model 824-1

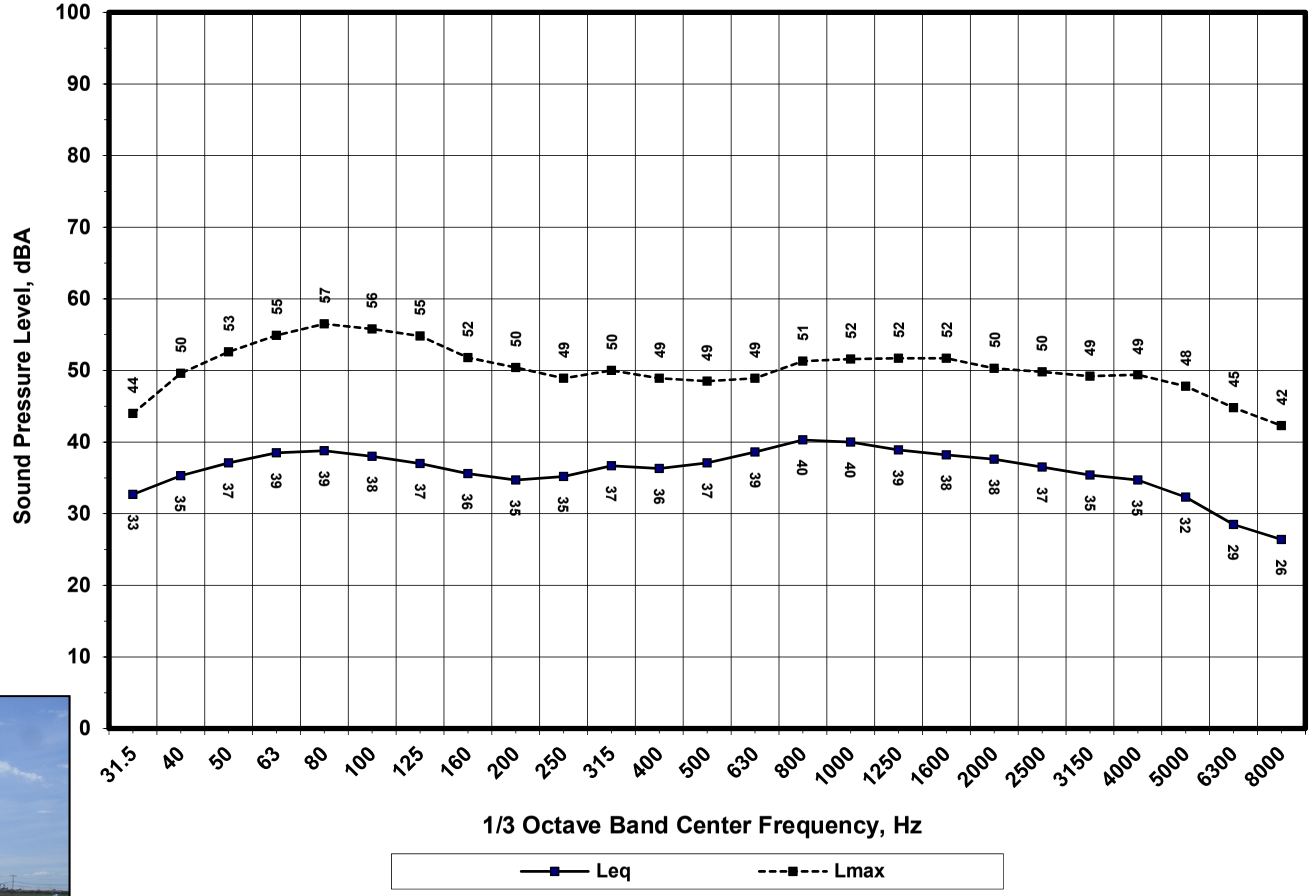
Calibrator: LDL CAL 200
Wind Speed: 8 mph
Weather: Clear, dry, 72 F
Field Tech: NTP

Measurement Results, dBA

Duration:	0:10
L_{eq}:	50.8 dBA
L_{max}:	64.9 dBA
L_{min}:	42.5 dBA
L_{50}:	48
L_{90}:	45

Notes

Traffic from E. Woodward Ave., wind, and farming machinery are the primary noise sources.



Noise Measurement Site



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Appendix A
Short-Term Noise Monitoring Summary

Project: Oakwood Landing
Location: Site 3
Date: 5/24/2016
Time: 1:52 PM
SLM: Larson Davis Model 824-1

Calibrator: LDL CAL 200
Wind Speed: 8 mph
Weather: Clear, dry, 72 F
Field Tech: NTP

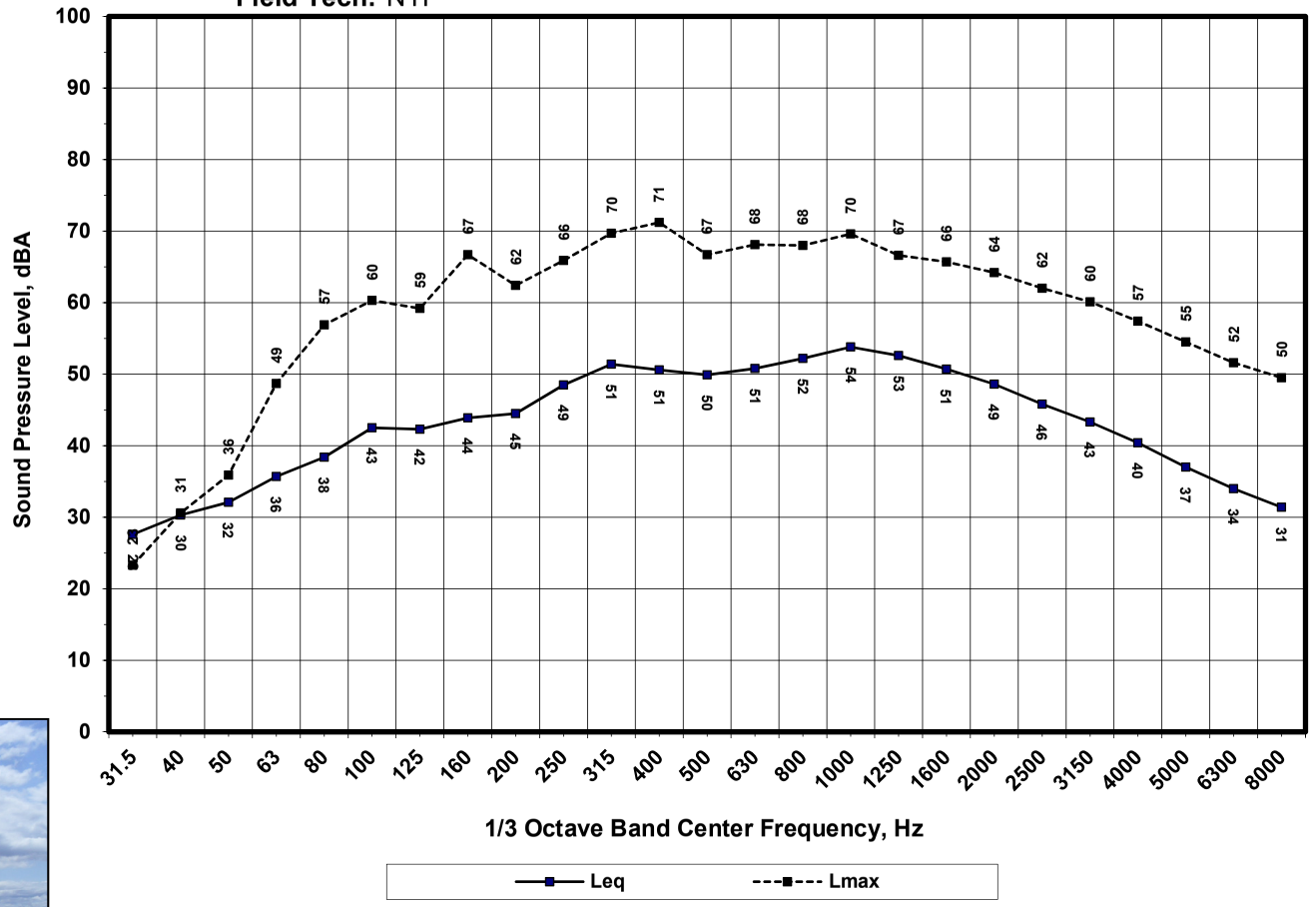
Measurement Results, dBA

Duration:	0:10
L_{eq}:	61.5 dBA
L_{max}:	78.3 dBA
L_{min}:	42.0 dBA
L_{50}:	50
L_{90}:	44

Notes

Traffic from E. Woodward Ave., wind, and farming machinery are the primary noise sources.





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Appendix A
Short-Term Noise Monitoring Summary

Project: Oakwood Landing
Location: Site 4
Date: 5/24/2016
Time: 2:55 PM
SLM: Larson Davis Model 824-1

Calibrator: LDL CAL 200
Wind Speed: 8 mph
Weather: Clear, dry, 72 F
Field Tech: NTP

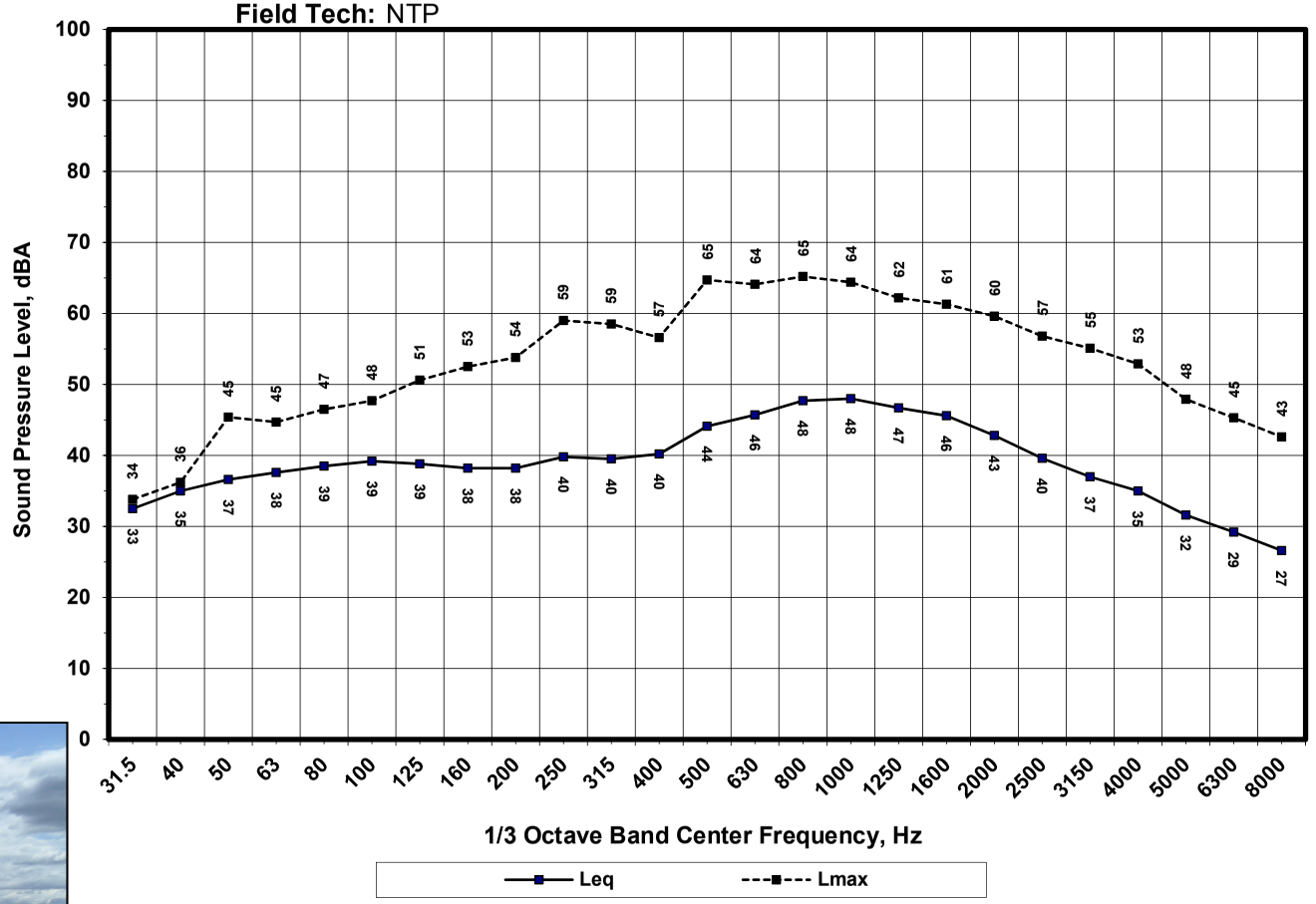
Measurement Results, dBA

Duration:	0:10
L_{eq}:	55.7 dBA
L_{max}:	72.5 dBA
L_{min}:	45.0 dBA
L_{50}:	50
L_{90}:	47

Notes

Traffic HWY 120 and S. McKinley Ave. are primary noise sources.





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Appendix B
FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2016-154 Oakwood Landing EIR
Description: Existing Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Airport Way	N. of Yosemite	12,470	83		17	2.0	1	40	65	0
2	Airport Way	Yosemite Ave to Daniels St	14,440	83		17	2.0	1	40	50	0
3	Airport Way	Atherton Dr to Woodward	7,790	83		17	2.0	1	40	75	0
4	Airport Way	South of Woodward Ave	4,530	83		17	2.0	1	40	100	0
5	McKinley Ave.	Yosemite Ave to Bronzan	2,410	83		17	2.0	1	45	40	0
6	Union Road	North of SR 120	18,130	83		17	2.0	1	40	50	-5
7	Union Road	Atherton Dr to Woodward	6,030	83		17	2.0	1	40	100	-5
8	Union Road	South of Woodward Ave	3,360	83		17	2.0	1	40	65	0
9	Woodward Ave.	W. of McKinley Ave	2,900	83		17	2.0	1	45	570	0
10	Woodward Ave.	McKinley Ave to Airport Wy	2,970	83		17	2.0	1	45	65	-5
11	Woodward Ave.	Airport Wy to Union Rd	2,680	83		17	2.0	1	45	65	0
12	Woodward Ave.	East of Union Road	6,970	83		17	2.0	1	45	55	-5
13	Yosemite Ave.	W. of McKinley Ave	6,190	83		17	2.0	1	45	115	0
14	Yosemite Ave.	McKinley Ave to Airport Wy	9,450	83		17	2.0	1	45	115	0
15	Yosemite Ave.	Airport Wy to Union Rd	13,800	83		17	2.0	1	45	60	0

Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Predicted Levels

Project #: 2016-154 Oakwood Landing EIR
Description: Existing Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Airport Way	N. of Yosemite	64.1	56.2	58.0	65.6
2	Airport Way	Yosemite Ave to Daniels St	66.4	58.5	60.3	67.9
3	Airport Way	Atherton Dr to Woodward	61.1	53.2	55.0	62.6
4	Airport Way	South of Woodward Ave	56.9	49.0	50.8	58.4
5	McKinley Ave.	Yosemite Ave to Bronzan	61.6	53.0	54.5	62.8
6	Union Road	North of SR 120	62.4	54.5	56.3	63.9
7	Union Road	Atherton Dr to Woodward	53.1	45.2	47.0	54.6
8	Union Road	South of Woodward Ave	58.4	50.5	52.3	59.9
9	Woodward Ave.	W. of McKinley Ave	45.1	36.5	38.0	46.3
10	Woodward Ave.	McKinley Ave to Airport Wy	54.3	45.7	47.2	55.6
11	Woodward Ave.	Airport Wy to Union Rd	58.9	50.3	51.8	60.1
12	Woodward Ave.	East of Union Road	59.1	50.5	52.0	60.4
13	Yosemite Ave.	W. of McKinley Ave	58.8	50.2	51.7	60.1
14	Yosemite Ave.	McKinley Ave to Airport Wy	60.6	52.0	53.5	61.9
15	Yosemite Ave.	Airport Wy to Union Rd	66.5	57.9	59.4	67.8

Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Noise Contour Output

Project #: 2016-154 Oakwood Landing EIR

Description: Existing Traffic

Ldn/CNEL: Ldn

Hard/Soft: Soft

Segment	Roadway Name	Segment Description	-------- Distances to Traffic Noise Contours -------- 75	70	65	60	55
1	Airport Way	N. of Yosemite	15	33	71	153	329
2	Airport Way	Yosemite Ave to Daniels St	17	36	78	169	363
3	Airport Way	Atherton Dr to Woodward	11	24	52	112	241
4	Airport Way	South of Woodward Ave	8	17	36	78	168
5	McKinley Ave.	Yosemite Ave to Bronzan	6	13	29	62	133
6	Union Road	North of SR 120	9	20	42	91	196
7	Union Road	Atherton Dr to Woodward	4	9	20	44	94
8	Union Road	South of Woodward Ave	6	14	30	64	137
9	Woodward Ave.	W. of McKinley Ave	7	15	32	70	151
10	Woodward Ave.	McKinley Ave to Airport Wy	3	7	15	33	71
11	Woodward Ave.	Airport Wy to Union Rd	7	14	31	66	143
12	Woodward Ave.	East of Union Road	6	13	27	58	125
13	Yosemite Ave.	W. of McKinley Ave	12	25	54	116	250
14	Yosemite Ave.	McKinley Ave to Airport Wy	15	33	71	154	331
15	Yosemite Ave.	Airport Wy to Union Rd	20	43	92	198	426

Appendix B
FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2016-154 Oakwood Landing EIR
Description: Existing + Project Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Airport Way	N. of Yosemite	12,890	83		17	2.0	1	40	65	0
2	Airport Way	Yosemite Ave to Daniels St	14,890	83		17	2.0	1	40	50	0
3	Airport Way	Atherton Dr to Woodward	12,710	83		17	2.0	1	40	75	0
4	Airport Way	South of Woodward Ave	4,660	83		17	2.0	1	40	100	0
5	McKinley Ave.	Yosemite Ave to Bronzan	8,240	83		17	2.0	1	45	40	0
6	Union Road	North of SR 120	18,910	83		17	2.0	1	40	50	-5
7	Union Road	Atherton Dr to Woodward	7,210	83		17	2.0	1	40	100	-5
8	Union Road	South of Woodward Ave	3,460	83		17	2.0	1	40	65	0
9	Woodward Ave.	W. of McKinley Ave	6,870	83		17	2.0	1	45	570	0
10	Woodward Ave.	McKinley Ave to Airport Wy	7,640	83		17	2.0	1	45	65	-5
11	Woodward Ave.	Airport Wy to Union Rd	4,830	83		17	2.0	1	45	65	0
12	Woodward Ave.	East of Union Road	7,430	83		17	2.0	1	45	55	-5
13	Yosemite Ave.	W. of McKinley Ave	10,720	83		17	2.0	1	45	115	0
14	Yosemite Ave.	McKinley Ave to Airport Wy	9,860	83		17	2.0	1	45	115	0
15	Yosemite Ave.	Airport Wy to Union Rd	14,100	83		17	2.0	1	45	60	0

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Predicted Levels

Project #: 2016-154 Oakwood Landing EIR
Description: Existing + Project Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Airport Way	N. of Yosemite	64.2	56.3	58.1	65.7
2	Airport Way	Yosemite Ave to Daniels St	66.6	58.6	60.5	68.0
3	Airport Way	Atherton Dr to Woodward	63.2	55.3	57.1	64.7
4	Airport Way	South of Woodward Ave	57.0	49.1	50.9	58.5
5	McKinley Ave.	Yosemite Ave to Bronzan	66.9	58.3	59.8	68.2
6	Union Road	North of SR 120	62.6	54.7	56.5	64.1
7	Union Road	Atherton Dr to Woodward	53.9	46.0	47.8	55.4
8	Union Road	South of Woodward Ave	58.5	50.6	52.4	60.0
9	Woodward Ave.	W. of McKinley Ave	48.8	40.2	41.7	50.1
10	Woodward Ave.	McKinley Ave to Airport Wy	58.4	49.8	51.3	59.7
11	Woodward Ave.	Airport Wy to Union Rd	61.4	52.8	54.3	62.7
12	Woodward Ave.	East of Union Road	59.4	50.8	52.3	60.6
13	Yosemite Ave.	W. of McKinley Ave	61.2	52.6	54.1	62.4
14	Yosemite Ave.	McKinley Ave to Airport Wy	60.8	52.2	53.7	62.1
15	Yosemite Ave.	Airport Wy to Union Rd	66.6	58.0	59.5	67.9

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Noise Contour Output

Project #: 2016-154 Oakwood Landing EIR

Description: Existing + Project Traffic

Ldn/CNEL: Ldn

Hard/Soft: Soft

Segment	Roadway Name	Segment Description	-------- Distances to Traffic Noise Contours -------- 75	70	65	60	55
1	Airport Way	N. of Yosemite	16	34	73	156	337
2	Airport Way	Yosemite Ave to Daniels St	17	37	80	172	371
3	Airport Way	Atherton Dr to Woodward	15	33	72	155	334
4	Airport Way	South of Woodward Ave	8	17	37	79	171
5	McKinley Ave.	Yosemite Ave to Bronzan	14	30	65	140	302
6	Union Road	North of SR 120	9	20	43	94	202
7	Union Road	Atherton Dr to Woodward	5	11	23	49	106
8	Union Road	South of Woodward Ave	7	14	30	65	140
9	Woodward Ave.	W. of McKinley Ave	12	27	58	124	268
10	Woodward Ave.	McKinley Ave to Airport Wy	6	13	29	62	133
11	Woodward Ave.	Airport Wy to Union Rd	10	21	46	98	212
12	Woodward Ave.	East of Union Road	6	13	28	61	131
13	Yosemite Ave.	W. of McKinley Ave	17	36	78	167	360
14	Yosemite Ave.	McKinley Ave to Airport Wy	16	34	73	158	341
15	Yosemite Ave.	Airport Wy to Union Rd	20	43	93	201	432

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2016-154 Oakwood Landing EIR
Description: Cumulative Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Airport Way	N. of Yosemite	23,300	83		17	2.0	1	40	65	0
2	Airport Way	Yosemite Ave to Daniels St	22,900	83		17	2.0	1	40	50	0
3	Airport Way	Atherton Dr to Woodward	15,100	83		17	2.0	1	40	75	0
4	Airport Way	South of Woodward Ave	9,800	83		17	2.0	1	40	100	0
5	McKinley Ave.	Yosemite Ave to Bronzan	8,400	83		17	2.0	1	45	40	0
6	Union Road	North of SR 120	27,100	83		17	2.0	1	40	50	-5
7	Union Road	Atherton Dr to Woodward	16,800	83		17	2.0	1	40	100	-5
8	Union Road	South of Woodward Ave	8,300	83		17	2.0	1	40	65	0
9	Woodward Ave.	W. of McKinley Ave	3,100	83		17	2.0	1	45	570	0
10	Woodward Ave.	McKinley Ave to Airport Wy	10,600	83		17	2.0	1	45	65	-5
11	Woodward Ave.	Airport Wy to Union Rd	5,900	83		17	2.0	1	45	65	0
12	Woodward Ave.	East of Union Road	12,300	83		17	2.0	1	45	55	-5
13	Yosemite Ave.	W. of McKinley Ave	8,600	83		17	2.0	1	45	115	0
14	Yosemite Ave.	McKinley Ave to Airport Wy	15,840	83		17	2.0	1	45	115	0
15	Yosemite Ave.	Airport Wy to Union Rd	19,800	83		17	2.0	1	45	60	0
							0.0	0	0	0	0

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Predicted Levels

Project #: 2016-154 Oakwood Landing EIR
Description: Cumulative Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Airport Way	N. of Yosemite	66.8	58.9	60.7	68.3
2	Airport Way	Yosemite Ave to Daniels St	68.4	60.5	62.3	69.9
3	Airport Way	Atherton Dr to Woodward	64.0	56.1	57.9	65.5
4	Airport Way	South of Woodward Ave	60.2	52.3	54.1	61.7
5	McKinley Ave.	Yosemite Ave to Bronzan	67.0	58.4	59.9	68.3
6	Union Road	North of SR 120	64.2	56.2	58.1	65.7
7	Union Road	Atherton Dr to Woodward	57.6	49.6	51.5	59.1
8	Union Road	South of Woodward Ave	62.3	54.4	56.2	63.8
9	Woodward Ave.	W. of McKinley Ave	45.4	36.8	38.3	46.6
10	Woodward Ave.	McKinley Ave to Airport Wy	59.9	51.3	52.7	61.1
11	Woodward Ave.	Airport Wy to Union Rd	62.3	53.7	55.2	63.6
12	Woodward Ave.	East of Union Road	61.6	53.0	54.5	62.8
13	Yosemite Ave.	W. of McKinley Ave	60.2	51.6	53.1	61.5
14	Yosemite Ave.	McKinley Ave to Airport Wy	62.9	54.3	55.8	64.1
15	Yosemite Ave.	Airport Wy to Union Rd	68.1	59.5	61.0	69.3

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Noise Contour Output

Project #: 2016-154 Oakwood Landing EIR
Description: Cumulative Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	-------- Distances to Traffic Noise Contours -------- 75	70	65	60	55
1	Airport Way	N. of Yosemite	23	50	108	232	500
2	Airport Way	Yosemite Ave to Daniels St	23	49	106	229	494
3	Airport Way	Atherton Dr to Woodward	17	37	81	174	374
4	Airport Way	South of Woodward Ave	13	28	60	130	280
5	McKinley Ave.	Yosemite Ave to Bronzan	14	31	66	142	306
6	Union Road	North of SR 120	12	26	55	119	256
7	Union Road	Atherton Dr to Woodward	9	19	40	87	186
8	Union Road	South of Woodward Ave	12	25	54	117	251
9	Woodward Ave.	W. of McKinley Ave	7	16	34	73	157
10	Woodward Ave.	McKinley Ave to Airport Wy	8	17	36	77	166
11	Woodward Ave.	Airport Wy to Union Rd	11	24	52	112	242
12	Woodward Ave.	East of Union Road	9	18	39	85	183
13	Yosemite Ave.	W. of McKinley Ave	14	31	67	144	311
14	Yosemite Ave.	McKinley Ave to Airport Wy	22	47	101	217	467
15	Yosemite Ave.	Airport Wy to Union Rd	25	54	117	252	542

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2016-154 Oakwood Landing EIR
Description: Cumulative + Project Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Airport Way	N. of Yosemite	23,860	83		17	2.0	1	40	65	0
2	Airport Way	Yosemite Ave to Daniels St	23,350	83		17	2.0	1	40	50	0
3	Airport Way	Atherton Dr to Woodward	16,890	83		17	2.0	1	40	75	0
4	Airport Way	South of Woodward Ave	9,860	83		17	2.0	1	40	100	0
5	McKinley Ave.	Yosemite Ave to Bronzan	9,030	83		17	2.0	1	45	40	0
6	Union Road	North of SR 120	27,610	83		17	2.0	1	40	50	-5
7	Union Road	Atherton Dr to Woodward	17,730	83		17	2.0	1	40	100	-5
8	Union Road	South of Woodward Ave	8,340	83		17	2.0	1	40	65	0
9	Woodward Ave.	W. of McKinley Ave	6,990	83		17	2.0	1	45	570	0
10	Woodward Ave.	McKinley Ave to Airport Wy	12,720	83		17	2.0	1	45	65	-5
11	Woodward Ave.	Airport Wy to Union Rd	7,480	83		17	2.0	1	45	65	0
12	Woodward Ave.	East of Union Road	12,300	83		17	2.0	1	45	55	-5
13	Yosemite Ave.	W. of McKinley Ave	8,600	83		17	2.0	1	45	115	0
14	Yosemite Ave.	McKinley Ave to Airport Wy	16,300	83		17	2.0	1	45	115	0
15	Yosemite Ave.	Airport Wy to Union Rd	20,030	83		17	2.0	1	45	60	0

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Predicted Levels

Project #: 2016-154 Oakwood Landing EIR
Description: Cumulative + Project Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Airport Way	N. of Yosemite	66.9	59.0	60.8	68.4
2	Airport Way	Yosemite Ave to Daniels St	68.5	60.6	62.4	70.0
3	Airport Way	Atherton Dr to Woodward	64.5	56.5	58.4	66.0
4	Airport Way	South of Woodward Ave	60.3	52.3	54.1	61.7
5	McKinley Ave.	Yosemite Ave to Bronzan	67.3	58.7	60.2	68.6
6	Union Road	North of SR 120	64.3	56.3	58.1	65.7
7	Union Road	Atherton Dr to Woodward	57.8	49.9	51.7	59.3
8	Union Road	South of Woodward Ave	62.3	54.4	56.2	63.8
9	Woodward Ave.	W. of McKinley Ave	48.9	40.3	41.8	50.2
10	Woodward Ave.	McKinley Ave to Airport Wy	60.7	52.0	53.5	61.9
11	Woodward Ave.	Airport Wy to Union Rd	63.3	54.7	56.2	64.6
12	Woodward Ave.	East of Union Road	61.6	53.0	54.5	62.8
13	Yosemite Ave.	W. of McKinley Ave	60.2	51.6	53.1	61.5
14	Yosemite Ave.	McKinley Ave to Airport Wy	63.0	54.4	55.9	64.3
15	Yosemite Ave.	Airport Wy to Union Rd	68.1	59.5	61.0	69.4

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Noise Contour Output

Project #: 2016-154 Oakwood Landing EIR
Description: Cumulative + Project Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	-------- Distances to Traffic Noise Contours -------- 75	70	65	60	55
1	Airport Way	N. of Yosemite	24	51	109	236	508
2	Airport Way	Yosemite Ave to Daniels St	23	50	108	232	500
3	Airport Way	Atherton Dr to Woodward	19	40	87	187	403
4	Airport Way	South of Woodward Ave	13	28	61	131	282
5	McKinley Ave.	Yosemite Ave to Bronzan	15	32	69	149	321
6	Union Road	North of SR 120	12	26	56	121	260
7	Union Road	Atherton Dr to Woodward	9	19	42	90	193
8	Union Road	South of Woodward Ave	12	25	54	117	252
9	Woodward Ave.	W. of McKinley Ave	13	27	58	126	271
10	Woodward Ave.	McKinley Ave to Airport Wy	9	19	40	87	187
11	Woodward Ave.	Airport Wy to Union Rd	13	28	61	132	283
12	Woodward Ave.	East of Union Road	9	18	39	85	183
13	Yosemite Ave.	W. of McKinley Ave	14	31	67	144	311
14	Yosemite Ave.	McKinley Ave to Airport Wy	22	48	103	221	476
15	Yosemite Ave.	Airport Wy to Union Rd	25	55	118	254	546

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Data Input Sheet

Project #: 2016-154 Oakwood Landing EIR
Description: Cumulative + Project Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name - Segment	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Aterheron Drive - East of McKinley	5,500	83		17	2	1	45	75	
2	SR 120 - Residential East of McKinley	130,200	69		31	1	5	65	400	
3	Atherton - Residential west of McKinley	21,660	83		17	2	1	45	65	
4	McKinley - Residential south of Atherton	16,190	83		17	2	1	45	65	
5	Woodward - Residential west of McKinley	6,990	83		17	2	1	45	65	

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #: 2016-154 Oakwood Landing EIR
Description: Cumulative + Project Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name - Segment	Autos	Medium Trucks	Heavy Trucks	Total
1	Aterheron Drive - East of McKinley	61	52	54	62
2	SR 120 - Residential East of McKinley	70	57	67	72
3	Atherton - Residential west of McKinley	68	59	61	69
4	McKinley - Residential south of Atherton	67	58	60	68
5	Woodward - Residential west of McKinley	63	54	56	64

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FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2016-154 Oakwood Landing EIR
Description Cumulative + Project Traffic
Roadway Name: Aterheron Drive - East of McKinley
Location(s): 1

Noise Level Data:

Year: Cumulative + Project Traffic
Auto L_{dn}, dB: 61
Medium Truck L_{dn}, dB: 52
Heavy Truck L_{dn}, dB: 54

Site Geometry:

Receiver Description: Aterheron Drive - East of McKinley
Centerline to Barrier Distance (C_1): 60
Barrier to Receiver Distance (C_2): 15
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 0
Receiver Elevation[1]: 5
Base of Barrier Elevation: 0
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
6	6	54	46	49	**56**	Yes	Yes	Yes
7	7	53	45	48	**55**	Yes	Yes	Yes
8	8	52	44	47	**54**	Yes	Yes	Yes
9	9	51	43	46	**52**	Yes	Yes	Yes
10	10	50	42	44	**52**	Yes	Yes	Yes
11	11	49	41	43	**51**	Yes	Yes	Yes
12	12	48	40	43	**50**	Yes	Yes	Yes
13	13	47	39	41	**49**	Yes	Yes	Yes
14	14	47	38	41	**48**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2016-154 Oakwood Landing EIR
Description Cumulative + Project Traffic
Roadway Name: SR 120 - Residential East of McKinley
Location(s): 2

Noise Level Data:

Year: Cumulative + Project Traffic
Auto L_{dn}, dB: 70
Medium Truck L_{dn}, dB: 57
Heavy Truck L_{dn}, dB: 67

Site Geometry:

Receiver Description: SR 120 - Residential East of McKinley
Centerline to Barrier Distance (C_1): 385
Barrier to Receiver Distance (C_2): 15
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 0
Receiver Elevation[1]: 5
Base of Barrier Elevation: 0
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
6	6	65	51	62	**67**	Yes	Yes	Yes
7	7	64	50	61	**66**	Yes	Yes	Yes
8	8	62	49	60	**64**	Yes	Yes	Yes
9	9	61	48	59	**63**	Yes	Yes	Yes
10	10	60	47	57	**62**	Yes	Yes	Yes
11	11	59	46	57	**61**	Yes	Yes	Yes
12	12	59	45	56	**61**	Yes	Yes	Yes
13	13	58	44	55	**60**	Yes	Yes	Yes
14	14	57	43	54	**59**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2016-154 Oakwood Landing EIR
Description Cumulative + Project Traffic
Roadway Name: Atherton - Residential west of McKinley
Location(s): 3

Noise Level Data:

Year: Cumulative + Project Traffic
Auto L_{dn}, dB: 68
Medium Truck L_{dn}, dB: 59
Heavy Truck L_{dn}, dB: 60

Site Geometry:

Receiver Description: Atherton - Residential west of McKinley
Centerline to Barrier Distance (C_1): 50
Barrier to Receiver Distance (C_2): 15
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 0
Receiver Elevation[1]: 5
Base of Barrier Elevation: 0
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
6	6	61	53	55	**63**	Yes	Yes	Yes
7	7	60	52	54	**61**	Yes	Yes	Yes
8	8	59	51	53	**60**	Yes	Yes	Yes
9	9	57	49	51	**59**	Yes	Yes	Yes
10	10	57	48	50	**58**	Yes	Yes	Yes
11	11	55	47	49	**57**	Yes	Yes	Yes
12	12	55	46	48	**56**	Yes	Yes	Yes
13	13	54	46	47	**55**	Yes	Yes	Yes
14	14	53	45	46	**55**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2016-154 Oakwood Landing EIR
Description Cumulative + Project Traffic
Roadway Name: McKinley - Residential south of Atherton
Location(s): 4

Noise Level Data:

Year: Cumulative + Project Traffic
Auto L_{dn}, dB: 67
Medium Truck L_{dn}, dB: 58
Heavy Truck L_{dn}, dB: 60

Site Geometry:

Receiver Description: McKinley - Residential south of Atherton
Centerline to Barrier Distance (C_1): 50
Barrier to Receiver Distance (C_2): 15
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 0
Receiver Elevation[1]: 5
Base of Barrier Elevation: 0
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
6	6	60	52	55	**62**	Yes	Yes	Yes
7	7	59	51	54	**60**	Yes	Yes	Yes
8	8	57	49	53	**59**	Yes	Yes	Yes
9	9	56	48	51	**58**	Yes	Yes	Yes
10	10	55	47	50	**57**	Yes	Yes	Yes
11	11	54	46	49	**56**	Yes	Yes	Yes
12	12	53	45	48	**55**	Yes	Yes	Yes
13	13	53	44	47	**54**	Yes	Yes	Yes
14	14	52	44	46	**54**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2016-154 Oakwood Landing EIR
Description Cumulative + Project Traffic
Roadway Name: Woodward - Residential west of McKinley
Location(s): 5

Noise Level Data:

Year: Cumulative + Project Traffic
Auto L_{dn}, dB: 63
Medium Truck L_{dn}, dB: 54
Heavy Truck L_{dn}, dB: 56

Site Geometry:

Receiver Description: Woodward - Residential west of McKinley
Centerline to Barrier Distance (C_1): 50
Barrier to Receiver Distance (C_2): 15
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 0
Receiver Elevation[1]: 5
Base of Barrier Elevation: 0
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
6	6	56	48	51	**58**	Yes	Yes	Yes
7	7	55	47	50	**57**	Yes	Yes	Yes
8	8	54	46	49	**55**	Yes	Yes	Yes
9	9	53	44	48	**54**	Yes	Yes	Yes
10	10	52	44	46	**53**	Yes	Yes	Yes
11	11	51	43	45	**52**	Yes	Yes	Yes
12	12	50	42	44	**51**	Yes	Yes	Yes
13	13	49	41	43	**51**	Yes	Yes	Yes
14	14	48	40	43	**50**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

j.c. brennan & associates
consultants in acoustics

Appendix E

Traffic Data

APPENDIX 3.13-1:
TECHNICAL CALCULATIONS –
EXISTING CONDITIONS
INTERSECTION LOS

Intersection	
Intersection Delay, s/veh	11.5
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	18	121	21	0	23	196	89	0	69	33	24
Future Vol, veh/h	0	18	121	21	0	23	196	89	0	69	33	24
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	0	20	138	24	0	26	223	101	0	78	38	27
Number of Lanes	0	1	1	0	0	1	1	1	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	3	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	3
HCM Control Delay	11.7	11	11.6
HCM LOS	B	B	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1
Vol Left, %	55%	100%	0%	100%	0%	0%	64%
Vol Thru, %	26%	0%	85%	0%	100%	0%	16%
Vol Right, %	19%	0%	15%	0%	0%	100%	20%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	126	18	142	23	196	89	150
LT Vol	69	18	0	23	0	0	96
Through Vol	33	0	121	0	196	0	24
RT Vol	24	0	21	0	0	89	30
Lane Flow Rate	143	20	161	26	223	101	170
Geometry Grp	7	8	8	7	7	7	7
Degree of Util (X)	0.26	0.04	0.292	0.047	0.369	0.148	0.309
Departure Headway (Hd)	6.544	7.12	6.505	6.479	5.972	5.262	6.528
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	548	502	552	553	601	681	551
Service Time	4.293	4.871	4.256	4.219	3.712	3.002	4.275
HCM Lane V/C Ratio	0.261	0.04	0.292	0.047	0.371	0.148	0.309
HCM Control Delay	11.6	10.2	11.9	9.5	12.2	8.9	12.2
HCM Lane LOS	B	B	B	A	B	A	B
HCM 95th-tile Q	1	0.1	1.2	0.1	1.7	0.5	1.3

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	96	24	30
Future Vol, veh/h	0	96	24	30
Peak Hour Factor	0.88	0.88	0.88	0.88
Heavy Vehicles, %	7	7	7	7
Mvmt Flow	0	109	27	34
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	3
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	12.2
HCM LOS	B

Lane

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	51	112	64	45	24	21
Future Vol, veh/h	51	112	64	45	24	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	2	5	0	0	5
Mvmt Flow	57	126	72	51	27	24

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	122	0	-	0	337	97
Stage 1	-	-	-	-	97	-
Stage 2	-	-	-	-	240	-
Critical Hdwy	4.1	-	-	-	6.4	6.25
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.345
Pot Cap-1 Maneuver	1478	-	-	-	663	951
Stage 1	-	-	-	-	932	-
Stage 2	-	-	-	-	805	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1478	-	-	-	636	951
Mov Cap-2 Maneuver	-	-	-	-	636	-
Stage 1	-	-	-	-	932	-
Stage 2	-	-	-	-	772	-

Approach	EB	WB	SB
HCM Control Delay, s	2.4	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1478	-	-	-	752
HCM Lane V/C Ratio	0.039	-	-	-	0.067
HCM Control Delay (s)	7.5	0	-	-	10.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	114	28	78	258	188	117	175	81	166	191	93
Future Volume (veh/h)	31	114	28	78	258	188	117	175	81	166	191	93
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1712	1860	1900	1827	1858	1900	1845	1827	1863	1827	1792	1845
Adj Flow Rate, veh/h	36	131	32	90	297	216	134	201	93	191	220	107
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	11	0	0	4	1	1	3	4	2	4	6	3
Cap, veh/h	99	678	160	168	546	386	211	399	344	282	467	409
Arrive On Green	0.06	0.24	0.21	0.10	0.28	0.25	0.12	0.22	0.22	0.16	0.26	0.26
Sat Flow, veh/h	1630	2821	667	1740	1975	1398	1757	1827	1577	1740	1792	1568
Grp Volume(v), veh/h	36	80	83	90	265	248	134	201	93	191	220	107
Grp Sat Flow(s),veh/h/ln	1630	1767	1721	1740	1765	1608	1757	1827	1577	1740	1792	1568
Q Serve(g_s), s	1.2	2.1	2.2	2.8	7.2	7.6	4.1	5.5	2.8	5.9	5.9	3.1
Cycle Q Clear(g_c), s	1.2	2.1	2.2	2.8	7.2	7.6	4.1	5.5	2.8	5.9	5.9	3.1
Prop In Lane	1.00		0.39	1.00		0.87	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	99	425	414	168	488	445	211	399	344	282	467	409
V/C Ratio(X)	0.36	0.19	0.20	0.53	0.54	0.56	0.64	0.50	0.27	0.68	0.47	0.26
Avail Cap(c_a), veh/h	460	842	820	983	1340	1221	403	1580	1364	799	1962	1716
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.6	17.1	17.4	24.4	17.4	18.2	23.7	19.4	18.4	22.3	17.7	16.6
Incr Delay (d2), s/veh	2.2	0.2	0.2	2.6	0.9	1.1	3.2	1.0	0.4	2.8	0.7	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	1.0	1.1	1.4	3.7	3.5	2.2	2.8	1.2	3.0	3.0	1.3
LnGrp Delay(d),s/veh	27.8	17.3	17.7	27.0	18.4	19.3	26.9	20.4	18.8	25.2	18.4	17.0
LnGrp LOS	C	B	B	C	B	B	C	C	B	C	B	B
Approach Vol, veh/h		199			603			428			518	
Approach Delay, s/veh		19.4			20.1			22.1			20.6	
Approach LOS		B			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.2	16.4	9.5	17.6	10.8	18.8	7.4	19.7
Change Period (Y+Rc), s	5.3	5.3	5.7	5.7	5.3	5.3	5.7	5.7
Max Green Setting (Gmax), s	24.7	47.7	30.3	25.3	11.7	60.7	14.3	41.3
Max Q Clear Time (g_c+I1), s	7.9	7.5	4.8	4.2	6.1	7.9	3.2	9.6
Green Ext Time (p_c), s	0.4	3.1	0.2	3.7	0.1	3.2	0.0	4.0

Intersection Summary	
HCM 2010 Ctrl Delay	20.6
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	17	134	256	30	32	146	394	141	27	354	64
Future Volume (veh/h)	50	17	134	256	30	32	146	394	141	27	354	64
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776
Adj Flow Rate, veh/h	56	19	2	284	33	4	162	438	58	30	393	27
Adj No. of Lanes	2	1	1	2	1	1	2	2	1	1	2	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	147	139	115	416	285	237	265	1383	605	47	1204	531
Arrive On Green	0.04	0.08	0.08	0.13	0.16	0.16	0.08	0.41	0.41	0.03	0.36	0.36
Sat Flow, veh/h	3281	1776	1469	3281	1776	1479	3281	3374	1475	1691	3374	1488
Grp Volume(v), veh/h	56	19	2	284	33	4	162	438	58	30	393	27
Grp Sat Flow(s),veh/h/ln	1640	1776	1469	1640	1776	1479	1640	1687	1475	1691	1687	1488
Q Serve(g_s), s	0.7	0.4	0.1	3.7	0.7	0.1	2.1	3.9	1.1	0.8	3.8	0.5
Cycle Q Clear(g_c), s	0.7	0.4	0.1	3.7	0.7	0.1	2.1	3.9	1.1	0.8	3.8	0.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	147	139	115	416	285	237	265	1383	605	47	1204	531
V/C Ratio(X)	0.38	0.14	0.02	0.68	0.12	0.02	0.61	0.32	0.10	0.64	0.33	0.05
Avail Cap(c_a), veh/h	293	634	524	512	753	627	366	1383	605	189	1204	531
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.8	19.2	19.1	18.7	16.1	15.8	19.9	9.0	8.1	21.6	10.5	9.4
Incr Delay (d2), s/veh	1.6	0.4	0.1	2.8	0.2	0.0	2.3	0.6	0.3	13.4	0.7	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.2	0.0	1.8	0.4	0.0	1.1	1.9	0.5	0.5	1.9	0.2
LnGrp Delay(d),s/veh	22.4	19.7	19.1	21.5	16.3	15.9	22.2	9.6	8.4	35.0	11.2	9.6
LnGrp LOS	C	B	B	C	B	B	C	A	A	D	B	A
Approach Vol, veh/h		77			321			658			450	
Approach Delay, s/veh		21.7			20.9			12.6			12.7	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.2	22.4	9.7	7.5	7.6	20.0	6.0	11.2
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	16.0	7.0	16.0	5.0	16.0	4.0	19.0
Max Q Clear Time (g_c+I1), s	2.8	5.9	5.7	2.4	4.1	5.8	2.7	2.7
Green Ext Time (p_c), s	0.0	4.1	0.1	0.1	0.0	4.2	0.0	0.2

Intersection Summary	
HCM 2010 Ctrl Delay	14.8
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	74	0	254	190	427	0	0	370	374
Future Volume (veh/h)	0	0	0	74	0	254	190	427	0	0	370	374
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1776	1776	1776	1776	0	0	1776	1776
Adj Flow Rate, veh/h				82	0	34	211	474	0	0	411	135
Adj No. of Lanes				0	1	1	1	1	0	0	1	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				7	7	7	7	7	0	0	7	7
Cap, veh/h				183	0	163	335	1213	0	0	737	613
Arrive On Green				0.11	0.00	0.11	0.20	0.68	0.00	0.00	0.42	0.42
Sat Flow, veh/h				1691	0	1509	1691	1776	0	0	1776	1476
Grp Volume(v), veh/h				82	0	34	211	474	0	0	411	135
Grp Sat Flow(s),veh/h/ln				1691	0	1509	1691	1776	0	0	1776	1476
Q Serve(g_s), s				1.7	0.0	0.8	4.4	4.4	0.0	0.0	6.8	2.3
Cycle Q Clear(g_c), s				1.7	0.0	0.8	4.4	4.4	0.0	0.0	6.8	2.3
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				183	0	163	335	1213	0	0	737	613
V/C Ratio(X)				0.45	0.00	0.21	0.63	0.39	0.00	0.00	0.56	0.22
Avail Cap(c_a), veh/h				908	0	811	939	1819	0	0	1819	1512
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				16.0	0.0	15.6	14.1	2.6	0.0	0.0	8.5	7.2
Incr Delay (d2), s/veh				2.1	0.0	0.8	2.0	0.2	0.0	0.0	0.8	0.2
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.9	0.0	0.4	2.2	2.2	0.0	0.0	3.4	0.9
LnGrp Delay(d),s/veh				18.1	0.0	16.4	16.1	2.8	0.0	0.0	9.3	7.4
LnGrp LOS				B		B	B	A			A	A
Approach Vol, veh/h					116			685			546	
Approach Delay, s/veh					17.6			6.9			8.9	
Approach LOS					B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		30.2			10.3	19.9		8.1
Change Period (Y+Rc), s		5.3			4.0	5.3		4.6
Max Green Setting (Gmax), s		38.0			20.0	38.0		20.0
Max Q Clear Time (g_c+I1), s		6.4			6.4	8.8		3.7
Green Ext Time (p_c), s		5.9			0.6	5.8		0.4

Intersection Summary		
HCM 2010 Ctrl Delay		8.6
HCM 2010 LOS		A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	146	0	90	0	0	0	0	471	208	114	330	0
Future Volume (veh/h)	146	0	90	0	0	0	0	471	208	114	330	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1776	1776				0	1776	1776	1776	1776	0
Adj Flow Rate, veh/h	162	0	11				0	523	94	127	367	0
Adj No. of Lanes	0	1	1				0	1	1	1	1	0
Peak Hour Factor	0.90	0.90	0.90				0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	7	7	7				0	7	7	7	7	0
Cap, veh/h	253	0	226				0	762	633	168	1129	0
Arrive On Green	0.15	0.00	0.15				0.00	0.43	0.43	0.10	0.64	0.00
Sat Flow, veh/h	1691	0	1509				0	1776	1476	1691	1776	0
Grp Volume(v), veh/h	162	0	11				0	523	94	127	367	0
Grp Sat Flow(s),veh/h/ln	1691	0	1509				0	1776	1476	1691	1776	0
Q Serve(g_s), s	3.4	0.0	0.2				0.0	8.9	1.4	2.7	3.5	0.0
Cycle Q Clear(g_c), s	3.4	0.0	0.2				0.0	8.9	1.4	2.7	3.5	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	253	0	226				0	762	633	168	1129	0
V/C Ratio(X)	0.64	0.00	0.05				0.00	0.69	0.15	0.76	0.33	0.00
Avail Cap(c_a), veh/h	935	0	834				0	1873	1557	908	1873	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	14.9	0.0	13.6				0.0	8.6	6.5	16.3	3.1	0.0
Incr Delay (d2), s/veh	3.3	0.0	0.1				0.0	1.0	0.1	6.8	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	0.1				0.0	4.4	0.6	1.6	1.7	0.0
LnGrp Delay(d),s/veh	18.2	0.0	13.7				0.0	9.6	6.6	23.1	3.3	0.0
LnGrp LOS	B		B					A	A	C	A	
Approach Vol, veh/h		173						617			494	
Approach Delay, s/veh		17.9						9.2			8.4	
Approach LOS		B						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	7.7	20.0		9.6		27.7		
Change Period (Y+Rc), s	4.0	5.3		4.6		5.3		
Max Green Setting (Gmax), s	20.0	38.0		20.0		38.0		
Max Q Clear Time (g_c+I1), s	4.7	10.9		5.4		5.5		
Green Ext Time (p_c), s	0.3	3.8		0.6		3.9		

Intersection Summary	
HCM 2010 Ctrl Delay	10.0
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	18.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	173	2	20	6	0	91	3	414	3	50	265	105
Future Vol, veh/h	173	2	20	6	0	91	3	414	3	50	265	105
Conflicting Peds, #/hr	1	0	1	1	0	1	1	0	1	1	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	340	-	0	210	-	210	175	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	197	2	23	7	0	103	3	470	3	57	301	119

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	894	894	303	895	894	472	302	0	0	471	0	0
Stage 1	416	416	-	478	478	-	-	-	-	-	-	-
Stage 2	478	478	-	417	416	-	-	-	-	-	-	-
Critical Hdwy	7.17	6.57	6.27	7.17	6.57	6.27	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.17	5.57	-	6.17	5.57	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.17	5.57	-	6.17	5.57	-	-	-	-	-	-	-
Follow-up Hdwy	3.563	4.063	3.363	3.563	4.063	3.363	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	257	275	725	256	275	582	1231	-	-	1065	-	-
Stage 1	604	583	-	559	547	-	-	-	-	-	-	-
Stage 2	559	547	-	603	583	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	202	259	724	235	259	581	1230	-	-	1064	-	-
Mov Cap-2 Maneuver	202	259	-	235	259	-	-	-	-	-	-	-
Stage 1	602	551	-	557	545	-	-	-	-	-	-	-
Stage 2	458	545	-	550	551	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	96.8	13	0.1	1
HCM LOS	F	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBL	SBT	SBR
Capacity (veh/h)	1230	-	-	203	724	235	-	581	1064	-	-
HCM Lane V/C Ratio	0.003	-	-	0.98	0.031	0.029	-	0.178	0.053	-	-
HCM Control Delay (s)	7.9	-	-	106.7	10.1	20.8	0	12.5	8.6	-	-
HCM Lane LOS	A	-	-	F	B	C	A	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	8.4	0.1	0.1	-	0.6	0.2	-	-

Intersection	
Intersection Delay, s/veh	11.7
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	133	22	70	0	3	11	71	0	58	145	6
Future Vol, veh/h	0	133	22	70	0	3	11	71	0	58	145	6
Peak Hour Factor	0.88	0.82	0.82	0.82	0.88	0.82	0.82	0.82	0.88	0.82	0.82	0.82
Heavy Vehicles, %	7	0	5	4	7	0	0	0	7	7	12	0
Mvmt Flow	0	162	27	85	0	4	13	87	0	71	177	7
Number of Lanes	0	0	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	12.5	9.5	12.1
HCM LOS	B	A	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	28%	59%	100%	0%	17%
Vol Thru, %	69%	10%	0%	13%	55%
Vol Right, %	3%	31%	0%	87%	28%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	209	225	3	82	206
LT Vol	58	133	3	0	35
Through Vol	145	22	0	11	114
RT Vol	6	70	0	71	57
Lane Flow Rate	255	274	4	100	251
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.391	0.419	0.007	0.158	0.367
Departure Headway (Hd)	5.526	5.497	6.82	5.694	5.261
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	650	653	524	628	683
Service Time	3.57	3.54	4.573	3.447	3.305
HCM Lane V/C Ratio	0.392	0.42	0.008	0.159	0.367
HCM Control Delay	12.1	12.5	9.6	9.5	11.3
HCM Lane LOS	B	B	A	A	B
HCM 95th-tile Q	1.9	2.1	0	0.6	1.7

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	35	114	57
Future Vol, veh/h	0	35	114	57
Peak Hour Factor	0.88	0.82	0.82	0.82
Heavy Vehicles, %	7	0	4	5
Mvmt Flow	0	43	139	70
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	11.3
HCM LOS	B

Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	75	0	276	90	495	0	0	486	305
Future Volume (veh/h)	0	0	0	75	0	276	90	495	0	0	486	305
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1776	1776	1776	1776	0	0	1776	1776
Adj Flow Rate, veh/h				83	0	26	100	550	0	0	540	126
Adj No. of Lanes				0	1	1	1	1	0	0	1	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				7	7	7	7	7	0	0	7	7
Cap, veh/h				229	0	205	281	1141	0	0	649	539
Arrive On Green				0.14	0.00	0.14	0.17	0.64	0.00	0.00	0.37	0.37
Sat Flow, veh/h				1691	0	1509	1691	1776	0	0	1776	1476
Grp Volume(v), veh/h				83	0	26	100	550	0	0	540	126
Grp Sat Flow(s),veh/h/ln				1691	0	1509	1691	1776	0	0	1776	1476
Q Serve(g_s), s				1.6	0.0	0.5	1.9	5.8	0.0	0.0	10.0	2.1
Cycle Q Clear(g_c), s				1.6	0.0	0.5	1.9	5.8	0.0	0.0	10.0	2.1
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				229	0	205	281	1141	0	0	649	539
V/C Ratio(X)				0.36	0.00	0.13	0.36	0.48	0.00	0.00	0.83	0.23
Avail Cap(c_a), veh/h				1450	0	1294	704	1522	0	0	1522	1265
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				14.2	0.0	13.7	13.3	3.3	0.0	0.0	10.4	7.9
Incr Delay (d2), s/veh				0.4	0.0	0.1	0.8	0.1	0.0	0.0	1.1	0.1
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.8	0.0	0.2	0.9	2.8	0.0	0.0	5.0	0.9
LnGrp Delay(d),s/veh				14.5	0.0	13.8	14.1	3.5	0.0	0.0	11.5	8.0
LnGrp LOS				B		B	B	A			B	A
Approach Vol, veh/h					109			650			666	
Approach Delay, s/veh					14.4			5.1			10.9	
Approach LOS					B			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		27.2			10.0	17.2		8.9
Change Period (Y+Rc), s		4.9			4.0	4.9		4.9
Max Green Setting (Gmax), s		30.0			15.0	30.0		30.0
Max Q Clear Time (g_c+I1), s		7.8			3.9	12.0		3.6
Green Ext Time (p_c), s		0.3			0.2	0.3		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		8.5
HCM 2010 LOS		A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	151	0	112	0	0	0	0	434	40	246	315	0
Future Volume (veh/h)	151	0	112	0	0	0	0	434	40	246	315	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1776	1776				0	1776	1900	1776	1776	0
Adj Flow Rate, veh/h	168	0	7				0	482	42	273	350	0
Adj No. of Lanes	0	1	1				0	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90				0.88	0.90	0.90	0.90	0.90	0.88
Percent Heavy Veh, %	7	7	7				0	7	7	7	7	0
Cap, veh/h	248	0	222				0	566	49	359	1173	0
Arrive On Green	0.13	0.00	0.15				0.00	0.35	0.33	0.21	0.66	0.00
Sat Flow, veh/h	1691	0	1509				0	1607	140	1691	1776	0
Grp Volume(v), veh/h	168	0	7				0	0	524	273	350	0
Grp Sat Flow(s),veh/h/ln	1691	0	1509				0	0	1747	1691	1776	0
Q Serve(g_s), s	3.9	0.0	0.2				0.0	0.0	11.5	6.3	3.5	0.0
Cycle Q Clear(g_c), s	3.9	0.0	0.2				0.0	0.0	11.5	6.3	3.5	0.0
Prop In Lane	1.00		1.00				0.00		0.08	1.00		0.00
Lane Grp Cap(c), veh/h	248	0	222				0	0	615	359	1173	0
V/C Ratio(X)	0.68	0.00	0.03				0.00	0.00	0.85	0.76	0.30	0.00
Avail Cap(c_a), veh/h	1257	0	1122				0	0	1299	1017	1320	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.2	0.0	15.2				0.0	0.0	12.5	15.4	3.0	0.0
Incr Delay (d2), s/veh	1.2	0.0	0.0				0.0	0.0	1.3	3.3	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	0.1				0.0	0.0	5.8	3.2	1.7	0.0
LnGrp Delay(d),s/veh	18.4	0.0	15.2				0.0	0.0	13.8	18.7	3.0	0.0
LnGrp LOS	B		B						B	B	A	
Approach Vol, veh/h		175						524			623	
Approach Delay, s/veh		18.3						13.8			9.9	
Approach LOS		B						B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	12.8	18.6		10.1		31.5		
Change Period (Y+Rc), s	4.0	4.9		4.9		4.9		
Max Green Setting (Gmax), s	25.0	30.0		30.0		30.0		
Max Q Clear Time (g_c+I1), s	13.3	13.5		5.9		5.5		
Green Ext Time (p_c), s	0.9	0.2		0.0		0.2		

Intersection Summary	
HCM 2010 Ctrl Delay	12.6
HCM 2010 LOS	B



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	200	256	3	193	234
Future Volume (veh/h)	5	200	256	3	193	234
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		0.98	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776	1776	1776	1776
Adj Flow Rate, veh/h	6	13	284	2	214	260
Adj No. of Lanes	2	2	2	1	2	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	7	7	7	7	7	7
Cap, veh/h	65	53	2205	966	1840	2205
Arrive On Green	0.02	0.02	0.65	0.65	0.65	0.65
Sat Flow, veh/h	3281	2656	3463	1478	2013	3463
Grp Volume(v), veh/h	6	13	284	2	214	260
Grp Sat Flow(s),veh/h/ln	1640	1328	1687	1478	1007	1687
Q Serve(g_s), s	0.0	0.1	0.8	0.0	1.1	0.7
Cycle Q Clear(g_c), s	0.0	0.1	0.8	0.0	1.9	0.7
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	65	53	2205	966	1840	2205
V/C Ratio(X)	0.09	0.25	0.13	0.00	0.12	0.12
Avail Cap(c_a), veh/h	2144	1736	2205	966	1840	2205
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.8	11.8	1.6	1.5	2.0	1.6
Incr Delay (d2), s/veh	0.6	2.4	0.1	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.1	0.4	0.0	0.3	0.4
LnGrp Delay(d),s/veh	12.4	14.2	1.7	1.5	2.1	1.7
LnGrp LOS	B	B	A	A	A	A
Approach Vol, veh/h	19		286			474
Approach Delay, s/veh	13.6		1.7			1.9
Approach LOS	B		A			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		20.0				20.0		4.5
Change Period (Y+Rc), s		4.0				4.0		4.0
Max Green Setting (Gmax), s		16.0				16.0		16.0
Max Q Clear Time (g_c+I1), s		2.8				3.9		2.1
Green Ext Time (p_c), s		3.9				3.7		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	2.1
HCM 2010 LOS	A

Notes

User approved ignoring U-Turning movement.

Intersection	
Intersection Delay, s/veh	11.9
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	37	128	4	0	24	83	116	0	11	119	22	0	69	103	23
Future Vol, veh/h	0	37	128	4	0	24	83	116	0	11	119	22	0	69	103	23
Peak Hour Factor	0.88	0.86	0.86	0.86	0.88	0.86	0.86	0.86	0.88	0.86	0.86	0.86	0.88	0.86	0.86	0.86
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	0	43	149	5	0	28	97	135	0	13	138	26	0	80	120	27
Number of Lanes	0	1	1	0	0	1	1	0	0	0	1	0	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	2	2
HCM Control Delay	11.1	11.8	12.2	12.3
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	7%	100%	0%	100%	0%	40%	0%
Vol Thru, %	78%	0%	97%	0%	42%	60%	0%
Vol Right, %	14%	0%	3%	0%	58%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	152	37	132	24	199	172	23
LT Vol	11	37	0	24	0	69	0
Through Vol	119	0	128	0	83	103	0
RT Vol	22	0	4	0	116	0	23
Lane Flow Rate	177	43	153	28	231	200	27
Geometry Grp	6	7	7	7	7	7	7
Degree of Util (X)	0.311	0.081	0.268	0.052	0.374	0.359	0.041
Departure Headway (Hd)	6.325	6.815	6.285	6.734	5.812	6.465	5.553
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	567	525	571	531	618	556	643
Service Time	4.378	4.569	4.039	4.485	3.562	4.216	3.304
HCM Lane V/C Ratio	0.312	0.082	0.268	0.053	0.374	0.36	0.042
HCM Control Delay	12.2	10.2	11.3	9.9	12	12.8	8.5
HCM Lane LOS	B	B	B	A	B	B	A
HCM 95th-tile Q	1.3	0.3	1.1	0.2	1.7	1.6	0.1

Intersection	
Intersection Delay, s/veh	16.7
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	42	311	39	0	71	184	146	0	19	26	20
Future Vol, veh/h	0	42	311	39	0	71	184	146	0	19	26	20
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	0	45	331	41	0	76	196	155	0	20	28	21
Number of Lanes	0	1	1	0	0	1	1	1	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	3	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	3
HCM Control Delay	22.7	11.6	11.5
HCM LOS	C	B	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1
Vol Left, %	29%	100%	0%	100%	0%	0%	60%
Vol Thru, %	40%	0%	89%	0%	100%	0%	29%
Vol Right, %	31%	0%	11%	0%	0%	100%	11%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	65	42	350	71	184	146	226
LT Vol	19	42	0	71	0	0	136
Through Vol	26	0	311	0	184	0	66
RT Vol	20	0	39	0	0	146	24
Lane Flow Rate	69	45	372	76	196	155	240
Geometry Grp	7	8	8	7	7	7	7
Degree of Util (X)	0.145	0.091	0.701	0.146	0.351	0.247	0.484
Departure Headway (Hd)	7.57	7.473	6.882	6.957	6.447	5.733	7.244
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	476	483	529	511	552	620	493
Service Time	5.27	5.173	4.582	4.756	4.245	3.531	5.04
HCM Lane V/C Ratio	0.145	0.093	0.703	0.149	0.355	0.25	0.487
HCM Control Delay	11.5	10.9	24.1	11	12.7	10.4	16.7
HCM Lane LOS	B	B	C	B	B	B	C
HCM 95th-tile Q	0.5	0.3	5.5	0.5	1.6	1	2.6

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	136	66	24
Future Vol, veh/h	0	136	66	24
Peak Hour Factor	0.94	0.94	0.94	0.94
Heavy Vehicles, %	4	4	4	4
Mvmt Flow	0	145	70	26
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	3
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	16.7
HCM LOS	C

Lane

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	38	92	100	32	73	60
Future Vol, veh/h	38	92	100	32	73	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	0	1	1	3	0	0
Mvmt Flow	44	106	115	37	84	69

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	152	0	-	0	326	133
Stage 1	-	-	-	-	133	-
Stage 2	-	-	-	-	193	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1441	-	-	-	672	922
Stage 1	-	-	-	-	898	-
Stage 2	-	-	-	-	845	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1441	-	-	-	650	922
Mov Cap-2 Maneuver	-	-	-	-	650	-
Stage 1	-	-	-	-	898	-
Stage 2	-	-	-	-	818	-

Approach	EB	WB	SB
HCM Control Delay, s	2.2	0	11
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1441	-	-	-	750
HCM Lane V/C Ratio	0.03	-	-	-	0.204
HCM Control Delay (s)	7.6	0	-	-	11
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	367	140	195	225	211	62	337	193	189	363	36
Future Volume (veh/h)	115	367	140	195	225	211	62	337	193	189	363	36
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1853	1900	1863	1900	1900	1759	1881	1863	1881	1881	1759
Adj Flow Rate, veh/h	132	422	161	224	259	243	71	387	222	217	417	41
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	1	2	2	2	0	0	8	1	2	1	1	8
Cap, veh/h	193	584	220	291	527	460	112	531	441	277	696	553
Arrive On Green	0.11	0.24	0.22	0.16	0.29	0.27	0.07	0.28	0.28	0.15	0.37	0.37
Sat Flow, veh/h	1792	2476	933	1774	1805	1575	1675	1881	1563	1792	1881	1495
Grp Volume(v), veh/h	132	298	285	224	259	243	71	387	222	217	417	41
Grp Sat Flow(s),veh/h/ln	1792	1760	1649	1774	1805	1575	1675	1881	1563	1792	1881	1495
Q Serve(g_s), s	6.9	15.2	15.6	11.8	11.6	12.8	4.0	18.2	11.6	11.4	17.5	1.7
Cycle Q Clear(g_c), s	6.9	15.2	15.6	11.8	11.6	12.8	4.0	18.2	11.6	11.4	17.5	1.7
Prop In Lane	1.00		0.57	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	193	415	389	291	527	460	112	531	441	277	696	553
V/C Ratio(X)	0.68	0.72	0.73	0.77	0.49	0.53	0.64	0.73	0.50	0.78	0.60	0.07
Avail Cap(c_a), veh/h	293	487	456	581	795	694	223	944	784	477	1194	949
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.0	34.3	34.9	39.1	28.6	29.7	44.4	31.7	29.3	39.7	24.9	19.9
Incr Delay (d2), s/veh	4.3	4.2	5.0	4.3	0.7	0.9	5.9	1.9	0.9	4.9	0.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	7.9	7.7	6.1	5.9	5.7	2.1	9.7	5.1	6.0	9.2	0.7
LnGrp Delay(d),s/veh	46.2	38.6	39.9	43.4	29.3	30.7	50.3	33.6	30.2	44.6	25.7	20.0
LnGrp LOS	D	D	D	D	C	C	D	C	C	D	C	B
Approach Vol, veh/h		715			726			680			675	
Approach Delay, s/veh		40.5			34.1			34.2			31.4	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.1	31.6	20.0	27.0	10.5	40.1	14.5	32.5
Change Period (Y+Rc), s	5.3	5.3	5.7	5.7	5.3	5.3	5.7	5.7
Max Green Setting (Gmax), s	24.7	47.7	30.3	25.3	11.7	60.7	14.3	41.3
Max Q Clear Time (g_c+I1), s	13.4	20.2	13.8	17.6	6.0	19.5	8.9	14.8
Green Ext Time (p_c), s	0.4	6.1	0.5	3.7	0.1	6.5	0.1	6.8

Intersection Summary	
HCM 2010 Ctrl Delay	35.1
HCM 2010 LOS	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	285	111	399	100	106	16	515	402	196	30	448	263
Future Volume (veh/h)	285	111	399	100	106	16	515	402	196	30	448	263
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827
Adj Flow Rate, veh/h	303	118	71	106	113	1	548	428	97	32	477	82
Adj No. of Lanes	2	1	1	2	1	1	2	2	1	1	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	365	313	261	196	221	184	654	1577	689	49	1001	441
Arrive On Green	0.11	0.17	0.17	0.06	0.12	0.12	0.19	0.45	0.45	0.03	0.29	0.29
Sat Flow, veh/h	3375	1827	1522	3375	1827	1517	3375	3471	1518	1740	3471	1530
Grp Volume(v), veh/h	303	118	71	106	113	1	548	428	97	32	477	82
Grp Sat Flow(s),veh/h/ln	1688	1827	1522	1688	1827	1517	1688	1736	1518	1740	1736	1530
Q Serve(g_s), s	4.9	3.2	2.2	1.7	3.2	0.0	8.7	4.3	2.1	1.0	6.3	2.2
Cycle Q Clear(g_c), s	4.9	3.2	2.2	1.7	3.2	0.0	8.7	4.3	2.1	1.0	6.3	2.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	365	313	261	196	221	184	654	1577	689	49	1001	441
V/C Ratio(X)	0.83	0.38	0.27	0.54	0.51	0.01	0.84	0.27	0.14	0.66	0.48	0.19
Avail Cap(c_a), veh/h	365	560	466	304	527	438	669	1577	689	157	1001	441
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.2	20.4	20.0	25.4	22.8	21.4	21.5	9.4	8.8	26.7	16.3	14.8
Incr Delay (d2), s/veh	14.8	0.7	0.6	2.3	1.8	0.0	9.0	0.4	0.4	13.9	1.6	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	1.7	1.0	0.8	1.7	0.0	4.9	2.1	0.9	0.7	3.2	1.1
LnGrp Delay(d),s/veh	39.0	21.1	20.5	27.7	24.7	21.4	30.6	9.9	9.3	40.6	17.9	15.8
LnGrp LOS	D	C	C	C	C	C	C	A	A	D	B	B
Approach Vol, veh/h		492			220			1073			591	
Approach Delay, s/veh		32.1			26.1			20.4			18.8	
Approach LOS		C			C			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.6	29.2	7.2	13.5	14.8	20.0	10.0	10.7
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.6	22.0	5.0	17.0	11.0	16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s	3.0	6.3	3.7	5.2	10.7	8.3	6.9	5.2
Green Ext Time (p_c), s	0.0	6.1	0.0	1.1	0.1	3.9	0.0	1.1

Intersection Summary	
HCM 2010 Ctrl Delay	22.9
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	185	0	345	80	768	0	0	668	279
Future Volume (veh/h)	0	0	0	185	0	345	80	768	0	0	668	279
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1827	1827	1827	1827	0	0	1827	1827
Adj Flow Rate, veh/h				197	0	178	85	817	0	0	711	160
Adj No. of Lanes				0	1	1	1	1	0	0	1	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %				4	4	4	4	4	0	0	4	4
Cap, veh/h				311	0	278	156	1235	0	0	982	817
Arrive On Green				0.18	0.00	0.18	0.09	0.68	0.00	0.00	0.54	0.54
Sat Flow, veh/h				1740	0	1553	1740	1827	0	0	1827	1519
Grp Volume(v), veh/h				197	0	178	85	817	0	0	711	160
Grp Sat Flow(s),veh/h/ln				1740	0	1553	1740	1827	0	0	1827	1519
Q Serve(g_s), s				5.8	0.0	5.9	2.6	14.5	0.0	0.0	16.3	3.0
Cycle Q Clear(g_c), s				5.8	0.0	5.9	2.6	14.5	0.0	0.0	16.3	3.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				311	0	278	156	1235	0	0	982	817
V/C Ratio(X)				0.63	0.00	0.64	0.55	0.66	0.00	0.00	0.72	0.20
Avail Cap(c_a), veh/h				650	0	580	672	1301	0	0	1301	1082
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				21.0	0.0	21.0	24.0	5.2	0.0	0.0	9.7	6.6
Incr Delay (d2), s/veh				2.6	0.0	3.0	3.0	1.2	0.0	0.0	1.6	0.1
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				3.0	0.0	2.8	1.4	7.5	0.0	0.0	8.5	1.3
LnGrp Delay(d),s/veh				23.5	0.0	24.0	27.0	6.4	0.0	0.0	11.2	6.7
LnGrp LOS				C		C	C	A			B	A
Approach Vol, veh/h					375			902			871	
Approach Delay, s/veh					23.7			8.4			10.4	
Approach LOS					C			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		41.3			7.6	33.7		13.9
Change Period (Y+Rc), s		5.3			4.0	5.3		4.6
Max Green Setting (Gmax), s		38.0			20.0	38.0		20.0
Max Q Clear Time (g_c+I1), s		16.5			4.6	18.3		7.9
Green Ext Time (p_c), s		10.6			0.2	10.1		1.4

Intersection Summary	
HCM 2010 Ctrl Delay	11.9
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	499	0	266	0	0	0	0	349	128	318	535	0
Future Volume (veh/h)	499	0	266	0	0	0	0	349	128	318	535	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1827				0	1827	1827	1827	1827	0
Adj Flow Rate, veh/h	531	0	71				0	371	35	338	569	0
Adj No. of Lanes	0	1	1				0	1	1	1	1	0
Peak Hour Factor	0.94	0.94	0.94				0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4				0	4	4	4	4	0
Cap, veh/h	536	0	479				0	523	435	393	1045	0
Arrive On Green	0.31	0.00	0.31				0.00	0.29	0.29	0.23	0.57	0.00
Sat Flow, veh/h	1740	0	1553				0	1827	1517	1740	1827	0
Grp Volume(v), veh/h	531	0	71				0	371	35	338	569	0
Grp Sat Flow(s),veh/h/ln	1740	0	1553				0	1827	1517	1740	1827	0
Q Serve(g_s), s	20.3	0.0	2.2				0.0	12.2	1.1	12.5	12.9	0.0
Cycle Q Clear(g_c), s	20.3	0.0	2.2				0.0	12.2	1.1	12.5	12.9	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	536	0	479				0	523	435	393	1045	0
V/C Ratio(X)	0.99	0.00	0.15				0.00	0.71	0.08	0.86	0.54	0.00
Avail Cap(c_a), veh/h	536	0	479				0	1074	892	521	1074	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	23.0	0.0	16.8				0.0	21.4	17.4	24.9	8.9	0.0
Incr Delay (d2), s/veh	36.3	0.0	0.2				0.0	1.6	0.1	10.8	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.0	0.0	1.0				0.0	6.3	0.5	7.2	6.6	0.0
LnGrp Delay(d),s/veh	59.3	0.0	16.9				0.0	23.0	17.5	35.7	9.4	0.0
LnGrp LOS	E		B					C	B	D	A	
Approach Vol, veh/h		602						406			907	
Approach Delay, s/veh		54.3						22.5			19.2	
Approach LOS		D						C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	19.1	23.2		24.6		42.2		
Change Period (Y+Rc), s	4.0	5.3		4.6		5.3		
Max Green Setting (Gmax), s	20.0	38.0		20.0		38.0		
Max Q Clear Time (g_c+I1), s	14.5	14.2		22.3		14.9		
Green Ext Time (p_c), s	0.6	3.7		0.0		3.7		

Intersection Summary	
HCM 2010 Ctrl Delay	30.9
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	9.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	131	3	7	6	6	75	6	271	8	93	482	226
Future Vol, veh/h	131	3	7	6	6	75	6	271	8	93	482	226
Conflicting Peds, #/hr	1	0	1	1	0	1	1	0	1	1	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	340	-	0	210	-	210	175	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	139	3	7	6	6	80	6	288	9	99	513	240

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1017	1014	515	1015	1014	290	514	0	0	289	0	0
Stage 1	712	712	-	302	302	-	-	-	-	-	-	-
Stage 2	305	302	-	713	712	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.236	-	-	2.236	-	-
Pot Cap-1 Maneuver	214	237	556	215	237	744	1041	-	-	1262	-	-
Stage 1	420	433	-	703	661	-	-	-	-	-	-	-
Stage 2	700	661	-	420	433	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	175	217	555	196	217	743	1040	-	-	1261	-	-
Mov Cap-2 Maneuver	175	217	-	196	217	-	-	-	-	-	-	-
Stage 1	417	399	-	698	657	-	-	-	-	-	-	-
Stage 2	615	657	-	378	399	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	75.7	12.1	0.2	0.9
HCM LOS	F	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBL	SBT	SBR
Capacity (veh/h)	1040	-	-	176	555	196	217	743	1261	-	-
HCM Lane V/C Ratio	0.006	-	-	0.81	0.013	0.033	0.029	0.107	0.078	-	-
HCM Control Delay (s)	8.5	-	-	79	11.6	24	22.1	10.4	8.1	-	-
HCM Lane LOS	A	-	-	F	B	C	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	5.5	0	0.1	0.1	0.4	0.3	-	-

Intersection	
Intersection Delay, s/veh	15
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	86	46	50	0	15	17	75	0	32	140	10
Future Vol, veh/h	0	86	46	50	0	15	17	75	0	32	140	10
Peak Hour Factor	0.88	0.87	0.87	0.87	0.88	0.87	0.87	0.87	0.88	0.87	0.87	0.87
Heavy Vehicles, %	7	1	0	4	7	7	0	1	7	3	4	0
Mvmt Flow	0	99	53	57	0	17	20	86	0	37	161	11
Number of Lanes	0	0	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	12.4	10.3	11.6
HCM LOS	B	B	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	18%	47%	100%	0%	25%
Vol Thru, %	77%	25%	0%	18%	50%
Vol Right, %	5%	27%	0%	82%	25%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	182	182	15	92	412
LT Vol	32	86	15	0	105
Through Vol	140	46	0	17	206
RT Vol	10	50	0	75	101
Lane Flow Rate	209	209	17	106	474
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.332	0.351	0.035	0.181	0.685
Departure Headway (Hd)	5.718	6.041	7.368	6.153	5.207
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	625	592	484	579	691
Service Time	3.785	4.109	5.144	3.928	3.259
HCM Lane V/C Ratio	0.334	0.353	0.035	0.183	0.686
HCM Control Delay	11.6	12.4	10.4	10.3	18.9
HCM Lane LOS	B	B	B	B	C
HCM 95th-tile Q	1.5	1.6	0.1	0.7	5.4

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	105	206	101
Future Vol, veh/h	0	105	206	101
Peak Hour Factor	0.88	0.87	0.87	0.87
Heavy Vehicles, %	7	2	7	2
Mvmt Flow	0	121	237	116
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	18.9
HCM LOS	C

Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	95	0	303	124	734	0	0	578	198
Future Volume (veh/h)	0	0	0	95	0	303	124	734	0	0	578	198
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1827	1827	1827	1827	0	0	1827	1827
Adj Flow Rate, veh/h				106	0	193	138	816	0	0	642	94
Adj No. of Lanes				0	1	1	1	1	0	0	1	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				4	4	4	4	4	0	0	4	4
Cap, veh/h				315	0	281	243	1157	0	0	732	608
Arrive On Green				0.18	0.00	0.18	0.14	0.63	0.00	0.00	0.40	0.40
Sat Flow, veh/h				1740	0	1553	1740	1827	0	0	1827	1519
Grp Volume(v), veh/h				106	0	193	138	816	0	0	642	94
Grp Sat Flow(s),veh/h/ln				1740	0	1553	1740	1827	0	0	1827	1519
Q Serve(g_s), s				2.3	0.0	5.0	3.2	12.7	0.0	0.0	14.0	1.7
Cycle Q Clear(g_c), s				2.3	0.0	5.0	3.2	12.7	0.0	0.0	14.0	1.7
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				315	0	281	243	1157	0	0	732	608
V/C Ratio(X)				0.34	0.00	0.69	0.57	0.71	0.00	0.00	0.88	0.15
Avail Cap(c_a), veh/h				1251	0	1116	607	1313	0	0	1313	1092
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				15.4	0.0	16.5	17.3	5.2	0.0	0.0	11.9	8.2
Incr Delay (d2), s/veh				0.2	0.0	1.1	2.1	1.1	0.0	0.0	1.4	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.1	0.0	2.2	1.7	6.5	0.0	0.0	7.2	0.7
LnGrp Delay(d),s/veh				15.6	0.0	17.6	19.4	6.4	0.0	0.0	13.3	8.3
LnGrp LOS				B		B	B	A			B	A
Approach Vol, veh/h					299			954			736	
Approach Delay, s/veh					16.9			8.2			12.6	
Approach LOS					B			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		31.2			10.0	21.2		11.8
Change Period (Y+Rc), s		4.9			4.0	4.9		4.9
Max Green Setting (Gmax), s		30.0			15.0	30.0		30.0
Max Q Clear Time (g_c+I1), s		14.7			5.2	16.0		7.0
Green Ext Time (p_c), s		0.4			0.3	0.4		0.1

Intersection Summary		
HCM 2010 Ctrl Delay		11.2
HCM 2010 LOS		B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	419	0	247	0	0	0	0	439	71	179	494	0
Future Volume (veh/h)	419	0	247	0	0	0	0	439	71	179	494	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1827				0	1827	1900	1827	1827	0
Adj Flow Rate, veh/h	466	0	68				0	488	75	199	549	0
Adj No. of Lanes	0	1	1				0	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90				0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	4				0	4	4	4	4	0
Cap, veh/h	529	0	472				0	540	83	259	1032	0
Arrive On Green	0.30	0.00	0.30				0.00	0.35	0.34	0.15	0.57	0.00
Sat Flow, veh/h	1740	0	1553				0	1542	237	1740	1827	0
Grp Volume(v), veh/h	466	0	68				0	0	563	199	549	0
Grp Sat Flow(s),veh/h/ln	1740	0	1553				0	0	1779	1740	1827	0
Q Serve(g_s), s	15.6	0.0	1.9				0.0	0.0	18.4	6.7	11.4	0.0
Cycle Q Clear(g_c), s	15.6	0.0	1.9				0.0	0.0	18.4	6.7	11.4	0.0
Prop In Lane	1.00		1.00				0.00		0.13	1.00		0.00
Lane Grp Cap(c), veh/h	529	0	472				0	0	623	259	1032	0
V/C Ratio(X)	0.88	0.00	0.14				0.00	0.00	0.90	0.77	0.53	0.00
Avail Cap(c_a), veh/h	880	0	785				0	0	900	997	1032	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	20.2	0.0	15.5				0.0	0.0	18.9	25.0	8.3	0.0
Incr Delay (d2), s/veh	3.2	0.0	0.1				0.0	0.0	7.2	4.7	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.8	0.0	0.8				0.0	0.0	10.2	3.5	5.7	0.0
LnGrp Delay(d),s/veh	23.4	0.0	15.5				0.0	0.0	26.1	29.7	8.5	0.0
LnGrp LOS	C		B						C	C	A	
Approach Vol, veh/h		534						563			748	
Approach Delay, s/veh		22.4						26.1			14.2	
Approach LOS		C						C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	13.1	25.4		22.6		38.5		
Change Period (Y+Rc), s	4.0	4.9		4.9		4.9		
Max Green Setting (Gmax), s	35.0	30.0		30.0		30.0		
Max Q Clear Time (g_c+I1), s	19.7	20.4		17.6		13.4		
Green Ext Time (p_c), s	0.7	0.1		0.1		0.3		

Intersection Summary	
HCM 2010 Ctrl Delay	20.2
HCM 2010 LOS	C



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	24	199	224	19	405	336
Future Volume (veh/h)	24	199	224	19	405	336
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		0.98	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1827	1827	1827	1827
Adj Flow Rate, veh/h	27	13	249	12	450	373
Adj No. of Lanes	2	2	2	1	2	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	4	4	4	4
Cap, veh/h	131	106	2224	975	1876	2224
Arrive On Green	0.04	0.04	0.64	0.64	0.64	0.64
Sat Flow, veh/h	3375	2733	3563	1521	2119	3563
Grp Volume(v), veh/h	27	13	249	12	450	373
Grp Sat Flow(s),veh/h/ln	1688	1367	1736	1521	1060	1736
Q Serve(g_s), s	0.2	0.1	0.7	0.1	2.6	1.1
Cycle Q Clear(g_c), s	0.2	0.1	0.7	0.1	3.3	1.1
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	131	106	2224	975	1876	2224
V/C Ratio(X)	0.21	0.12	0.11	0.01	0.24	0.17
Avail Cap(c_a), veh/h	2163	1751	2224	975	1876	2224
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.6	11.6	1.7	1.6	2.4	1.8
Incr Delay (d2), s/veh	0.8	0.5	0.1	0.0	0.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.1	0.3	0.0	0.8	0.5
LnGrp Delay(d),s/veh	12.4	12.1	1.8	1.6	2.7	2.0
LnGrp LOS	B	B	A	A	A	A
Approach Vol, veh/h	40		261			823
Approach Delay, s/veh	12.3		1.8			2.4
Approach LOS	B		A			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		20.0				20.0		5.0
Change Period (Y+Rc), s		4.0				4.0		4.0
Max Green Setting (Gmax), s		16.0				16.0		16.0
Max Q Clear Time (g_c+I1), s		2.7				5.3		2.2
Green Ext Time (p_c), s		5.4				4.7		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	2.6
HCM 2010 LOS	A

Notes

User approved ignoring U-Turning movement.

Intersection	
Intersection Delay, s/veh	20.3
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	69	307	14	0	16	72	83	0	4	114	30	0	189	158	37
Future Vol, veh/h	0	69	307	14	0	16	72	83	0	4	114	30	0	189	158	37
Peak Hour Factor	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94
Heavy Vehicles, %	7	4	4	4	7	4	4	4	7	4	4	4	7	4	4	4
Mvmt Flow	0	73	327	15	0	17	77	88	0	4	121	32	0	201	168	39
Number of Lanes	0	1	1	0	0	1	1	0	0	0	1	0	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	2	2
HCM Control Delay	20.4	13.1	14.1	25.8
HCM LOS	C	B	B	D

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	3%	100%	0%	100%	0%	54%	0%
Vol Thru, %	77%	0%	96%	0%	46%	46%	0%
Vol Right, %	20%	0%	4%	0%	54%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	148	69	321	16	155	347	37
LT Vol	4	69	0	16	0	189	0
Through Vol	114	0	307	0	72	158	0
RT Vol	30	0	14	0	83	0	37
Lane Flow Rate	157	73	341	17	165	369	39
Geometry Grp	6	7	7	7	7	7	7
Degree of Util (X)	0.326	0.153	0.66	0.038	0.326	0.737	0.068
Departure Headway (Hd)	7.464	7.506	6.963	8.026	7.125	7.192	6.202
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	480	478	519	446	505	502	577
Service Time	5.523	5.251	4.707	5.78	4.878	4.935	3.945
HCM Lane V/C Ratio	0.327	0.153	0.657	0.038	0.327	0.735	0.068
HCM Control Delay	14.1	11.6	22.3	11.1	13.3	27.6	9.4
HCM Lane LOS	B	B	C	B	B	D	A
HCM 95th-tile Q	1.4	0.5	4.8	0.1	1.4	6.1	0.2

APPENDIX 3.13-2:
TECHNICAL CALCULATIONS –
EXISTING CONDITIONS
FREEWAY LOS

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	9/21/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	Eastbound SR 120
From/To:	Yosemite ON to Airport OFF
Jurisdiction:	District 10
Analysis Year:	Existing Conditions
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	2159	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	600	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1271	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1271	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.6	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	Eastbound SR 120
Junction:	Airport Way Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Conditions
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2159	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	236	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	86	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	7160	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	2159		236		86		vph
Peak-hour factor, PHF	0.90		0.90		0.90		
Peak 15-min volume, v15	600		66		24		v
Trucks and buses	12		7		11		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.943	0.966	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2543	271	101	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2543 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2543	4700	No
$v_{FO} = v_F - v_R$	2272	4700	No
v_R	271	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2543 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2543	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 24.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.322	
Space mean speed in ramp influence area,	S_R = 57.6	mph
Space mean speed in outer lanes,	S_O = N/A	mph
Space mean speed for all vehicles,	S = 57.6	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Airport Way On-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1923	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	322	vph
Length of first accel/decel lane	415	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	263	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2060	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1923	322	263	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	534	89	73	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2265	370	302	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2265 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2635	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2265 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2635	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A =$ 23.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.338	
Space mean speed in ramp influence area,	S_R = 57.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.2	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	9/21/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	SR 120 Eastbound
From/To:	Airport ON to Union OFF
Jurisdiction:	District 10
Analysis Year:	Existing
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	2245	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	624	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1322	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1322	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	20.3	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Union Rd Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2245	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	263	vph
Length of first accel/decel lane	245	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	322	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2060	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	2245		263		322		vph
Peak-hour factor, PHF	0.90		0.90		0.90		
Peak 15-min volume, v15	624		73		89		v
Trucks and buses	12		7		7		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2644	302	370	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2644 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2644	4700	No
$v_{FO} = v_F - v_R$	2342	4700	No
v_R	302	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2644 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2644	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 24.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.325

Space mean speed in ramp influence area, S_R = 57.5 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 57.5 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Union Rd On-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1982	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	286	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	409	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1982	286	409	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	551	79	114	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2334	329	470	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2334 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2663	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2334 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2663	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 22.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.327	
Space mean speed in ramp influence area,	S_R = 57.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.5	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	9/21/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	Eastbound SR 120
From/To:	Yosemite ON to Airport OFF
Jurisdiction:	District 10
Analysis Year:	Existing Conditions
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	4146	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1152	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2442	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2442	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	49.6	mi/h
Number of lanes, N	2	
Density, D	49.2	pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	Eastbound SR 120
Junction:	Airport Way Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Conditions
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4146	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	765	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	150	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	7160	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	4146		765		150		vph
Peak-hour factor, PHF	0.90		0.90		0.90		
Peak 15-min volume, v15	1152		213		42		v
Trucks and buses	12		4		9		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.943	0.980	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4883	867	174	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4883 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4883	4700	Yes
$v_{FO} = v_F - v_R$	4016	4700	No
v_R	867	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 4883 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4883	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 44.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.376

Space mean speed in ramp influence area, S_R = 56.4 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 56.4 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Airport Way On-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3381	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	446	vph
Length of first accel/decel lane	415	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	666	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2060	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3381	446	666	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	939	124	185	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3982	505	755	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3982 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4487	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3982 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4487	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 37.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.630	
Space mean speed in ramp influence area,	S_R = 50.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 50.5	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	9/21/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR 120 Eastbound
From/To:	Airport ON to Union OFF
Jurisdiction:	District 10
Analysis Year:	Existing
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	3827	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1063	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2254	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2254	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	54.7	mi/h
Number of lanes, N	2	
Density, D	41.2	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Union Rd Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3827	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	666	vph
Length of first accel/decel lane	245	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	446	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2060	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	3827		666		446		vph
Peak-hour factor, PHF	0.90		0.90		0.90		
Peak 15-min volume, v15	1063		185		124		v
Trucks and buses	12		4		4		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4507	755	505	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4507 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4507	4700	No
$v_{FO} = v_F - v_R$	3752	4700	No
v_R	755	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 4507 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4507	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 40.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	D_S = 0.366	
Space mean speed in ramp influence area,	S_R = 56.6	mph
Space mean speed in outer lanes,	S_O = N/A	mph
Space mean speed for all vehicles,	S = 56.6	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Union Rd On-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3161	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	250	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	727	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3161	250	727	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	878	69	202	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3723	283	824	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3723 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4006	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3723 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4006	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 33.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.486	
Space mean speed in ramp influence area,	S_R = 53.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 53.8	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Union Rd Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3218	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	351	vph
Length of first accel/decel lane	180	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	632	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2110	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	3218		351		632		vph
Peak-hour factor, PHF	0.90		0.90		0.90		
Peak 15-min volume, v15	894		98		176		v
Trucks and buses	12		7		7		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3790	404	727	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3790 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3790	4700	No
$v_{FO} = v_F - v_R$	3386	4700	No
v_R	404	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3790 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3790	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 35.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.334

Space mean speed in ramp influence area, S_R = 57.3 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 57.3 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Union Rd On-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2867	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	395	vph
Length of first accel/decel lane	480	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	328	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2120	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2867	395	328	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	796	110	91	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3377	454	377	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 3377 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3831	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3377 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3831	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A =$ 32.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.458	
Space mean speed in ramp influence area,	S_R = 54.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.5	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	9/21/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	SR 120 Westbound
From/To:	Union ON to Airport OFF
Jurisdiction:	District 10
Analysis Year:	Existing
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	3262	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	906	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1921	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1921	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	61.2	mi/h
Number of lanes, N	2	
Density, D	31.4	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Airport Way Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3262	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	328	vph
Length of first accel/decel lane	185	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	395	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2120	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	3262		328		395		vph
Peak-hour factor, PHF	0.90		0.90		0.90		
Peak 15-min volume, v15	906		91		110		v
Trucks and buses	12		7		7		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3842	377	454	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3842 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3842	4700	No
$v_{FO} = v_F - v_R$	3465	4700	No
v_R	377	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3842 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3842	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 35.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	D_S = 0.332	
Space mean speed in ramp influence area,	S_R = 57.4	mph
Space mean speed in outer lanes,	S_O = N/A	mph
Space mean speed for all vehicles,	S = 57.4	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	Westbound SR 120
Junction:	Airport Way On-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Conditions
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2934	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	564	vph
Length of first accel/decel lane	512	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	104	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2934	564	104	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	815	157	29	v
Trucks and buses	12	7	11	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3456	649	122	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3456 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4105	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3456 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4105	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 34.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.511	
Space mean speed in ramp influence area,	S_R = 53.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 53.2	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	9/21/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	Westbound SR 120
From/To:	Airport ON to Yosemite OFF
Jurisdiction:	District 10
Analysis Year:	Existing Conditions
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	3498	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	972	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2060	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2060	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	58.8	mi/h
Number of lanes, N	2	
Density, D	35.0+	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Union Rd Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2853	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	398	vph
Length of first accel/decel lane	180	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	591	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2110	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	2853		398		591		vph
Peak-hour factor, PHF	0.90		0.90		0.90		
Peak 15-min volume, v15	793		111		164		v
Trucks and buses	12		4		4		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3360	451	670	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3360 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3360	4700	No
$v_{FO} = v_F - v_R$	2909	4700	No
v_R	451	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3360 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3360	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 31.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.339

Space mean speed in ramp influence area, S_R = 57.2 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 57.2 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Union Rd On-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2455	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	322	vph
Length of first accel/decel lane	480	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	530	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2120	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2455	322	530	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	682	89	147	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2891	365	601	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2891 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3256	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2891 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3256	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 27.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.379	
Space mean speed in ramp influence area,	S_R = 56.3	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 56.3	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	9/21/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR 120 Westbound
From/To:	Union ON to Airport OFF
Jurisdiction:	District 10
Analysis Year:	Existing
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	2777	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	771	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1635	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1635	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.2	mi/h
Number of lanes, N	2	
Density, D	25.5	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Airport Way Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2777	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	530	vph
Length of first accel/decel lane	185	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	322	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2120	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	2777		530		322		vph
Peak-hour factor, PHF	0.90		0.90		0.90		
Peak 15-min volume, v15	771		147		89		v
Trucks and buses	12		4		4		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3271	601	365	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3271 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3271	4700	No
$v_{FO} = v_F - v_R$	2670	4700	No
v_R	601	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3271 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3271	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 30.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	D_S = 0.352	
Space mean speed in ramp influence area,	S_R = 56.9	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 56.9	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.2

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	Westbound SR 120
Junction:	Airport Way On-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Conditions
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2247	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	359	vph
Length of first accel/decel lane	512	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	97	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2247	359	97	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	624	100	27	v
Trucks and buses	12	4	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2646	407	113	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2646 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3053	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2646 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3053	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 25.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.358	
Space mean speed in ramp influence area,	S_R = 56.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 56.8	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	9/21/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	Westbound SR 120
From/To:	Airport ON to Yosemite OFF
Jurisdiction:	District 10
Analysis Year:	Existing Conditions
Description:	Oakwood Landing

Flow Inputs and Adjustments

Volume, V	2606	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	724	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1535	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1535	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	2	
Density, D	23.7	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

APPENDIX 3.13-3:
TECHNICAL CALCULATIONS –
EXISTING PLUS PROJECT CONDITIONS
INTERSECTION LOS

Intersection	
Intersection Delay, s/veh	15.6
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	18	121	67	0	38	196	89	0	158	69	26
Future Vol, veh/h	0	18	121	67	0	38	196	89	0	158	69	26
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	0	20	138	76	0	43	223	101	0	180	78	30
Number of Lanes	0	1	1	0	0	1	1	1	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	3	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	3
HCM Control Delay	15.4	13.2	19.3
HCM LOS	C	B	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1
Vol Left, %	62%	100%	0%	100%	0%	0%	57%
Vol Thru, %	27%	0%	64%	0%	100%	0%	25%
Vol Right, %	10%	0%	36%	0%	0%	100%	18%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	253	18	188	38	196	89	168
LT Vol	158	18	0	38	0	0	96
Through Vol	69	0	121	0	196	0	42
RT Vol	26	0	67	0	0	89	30
Lane Flow Rate	288	20	214	43	223	101	191
Geometry Grp	7	8	8	7	7	7	7
Degree of Util (X)	0.576	0.046	0.437	0.089	0.43	0.175	0.391
Departure Headway (Hd)	7.207	8.146	7.372	7.458	6.946	6.228	7.37
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	500	439	487	481	519	575	489
Service Time	4.948	5.898	5.124	5.203	4.69	3.972	5.118
HCM Lane V/C Ratio	0.576	0.046	0.439	0.089	0.43	0.176	0.391
HCM Control Delay	19.3	11.3	15.8	10.9	14.9	10.3	14.8
HCM Lane LOS	C	B	C	B	B	B	B
HCM 95th-tile Q	3.6	0.1	2.2	0.3	2.1	0.6	1.8

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	96	42	30
Future Vol, veh/h	0	96	42	30
Peak Hour Factor	0.88	0.88	0.88	0.88
Heavy Vehicles, %	7	7	7	7
Mvmt Flow	0	109	48	34
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	3
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	14.8
HCM LOS	B

Lane

Intersection	
Intersection Delay, s/veh	14.4
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	135	236	0	0	11	115	83	0	0	47	35
Future Vol, veh/h	0	135	236	0	0	11	115	83	0	0	47	35
Peak Hour Factor	0.88	0.89	0.89	0.89	0.88	0.89	0.89	0.89	0.88	0.89	0.89	0.89
Heavy Vehicles, %	7	7	2	7	7	7	5	7	7	7	7	7
Mvmt Flow	0	152	265	0	0	12	129	93	0	0	53	39
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	17.7	11.6	10.3
HCM LOS	C	B	B

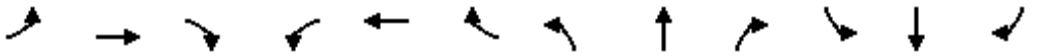
Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	36%	5%	69%
Vol Thru, %	57%	64%	55%	7%
Vol Right, %	43%	0%	40%	24%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	82	371	209	215
LT Vol	0	135	11	149
Through Vol	47	236	115	14
RT Vol	35	0	83	52
Lane Flow Rate	92	417	235	242
Geometry Grp	1	1	1	1
Degree of Util (X)	0.155	0.636	0.359	0.401
Departure Headway (Hd)	6.068	5.495	5.496	5.974
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	587	654	650	599
Service Time	4.148	3.549	3.558	4.038
HCM Lane V/C Ratio	0.157	0.638	0.362	0.404
HCM Control Delay	10.3	17.7	11.6	13
HCM Lane LOS	B	C	B	B
HCM 95th-tile Q	0.5	4.5	1.6	1.9

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	149	14	52
Future Vol, veh/h	0	149	14	52
Peak Hour Factor	0.88	0.89	0.89	0.89
Heavy Vehicles, %	7	7	7	5
Mvmt Flow	0	167	16	58
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	13
HCM LOS	B

Lane



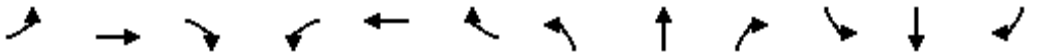
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	114	28	78	264	188	117	189	91	166	191	101
Future Volume (vph)	31	114	28	78	264	188	117	189	91	166	191	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1626	3413		1736	3281		1752	1827	1561	1736	1792	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1626	3413		1736	3281		1752	1827	1561	1736	1792	1568
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	36	131	32	90	303	216	134	217	105	191	220	116
RTOR Reduction (vph)	0	13	0	0	89	0	0	0	80	0	0	84
Lane Group Flow (vph)	36	150	0	90	430	0	134	217	25	191	220	32
Confl. Peds. (#/hr)			2			1			3			
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	11%	0%	11%	4%	1%	4%	3%	4%	2%	4%	6%	3%
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	4.5	15.4		8.2	19.1		12.2	17.3	17.3	15.3	20.4	20.4
Effective Green, g (s)	6.2	17.1		9.9	20.8		13.5	18.6	18.6	16.6	21.7	21.7
Actuated g/C Ratio	0.08	0.22		0.13	0.27		0.17	0.24	0.24	0.21	0.28	0.28
Clearance Time (s)	5.7	5.7		5.7	5.7		5.3	5.3	5.3	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	128	746		219	872		302	434	371	368	497	435
v/s Ratio Prot	0.02	0.04		c0.05	c0.13		0.08	0.12		c0.11	c0.12	
v/s Ratio Perm									0.02			0.02
v/c Ratio	0.28	0.20		0.41	0.49		0.44	0.50	0.07	0.52	0.44	0.07
Uniform Delay, d1	33.9	25.0		31.5	24.2		29.0	25.8	23.1	27.3	23.3	20.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.1		1.3	0.4		1.0	0.9	0.1	1.2	0.6	0.1
Delay (s)	35.1	25.1		32.7	24.7		30.0	26.7	23.2	28.5	23.9	20.9
Level of Service	D	C		C	C		C	C	C	C	C	C
Approach Delay (s)		26.9			25.9			26.9			24.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	78.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	114	28	78	264	188	117	189	91	166	191	101
Future Volume (veh/h)	31	114	28	78	264	188	117	189	91	166	191	101
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1712	1860	1900	1827	1858	1900	1845	1827	1863	1827	1792	1845
Adj Flow Rate, veh/h	36	131	17	90	303	114	134	217	13	191	220	19
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	11	0	0	4	1	1	3	4	2	4	6	3
Cap, veh/h	103	654	83	172	616	227	214	415	358	287	485	424
Arrive On Green	0.06	0.21	0.18	0.10	0.24	0.21	0.12	0.23	0.23	0.17	0.27	0.27
Sat Flow, veh/h	1630	3142	400	1740	2526	931	1757	1827	1577	1740	1792	1568
Grp Volume(v), veh/h	36	73	75	90	210	207	134	217	13	191	220	19
Grp Sat Flow(s),veh/h/ln	1630	1767	1776	1740	1765	1691	1757	1827	1577	1740	1792	1568
Q Serve(g_s), s	1.1	1.8	1.9	2.6	5.4	5.7	3.9	5.5	0.3	5.5	5.4	0.5
Cycle Q Clear(g_c), s	1.1	1.8	1.9	2.6	5.4	5.7	3.9	5.5	0.3	5.5	5.4	0.5
Prop In Lane	1.00		0.23	1.00		0.55	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	103	368	370	172	430	412	214	415	358	287	485	424
V/C Ratio(X)	0.35	0.20	0.20	0.52	0.49	0.50	0.63	0.52	0.04	0.67	0.45	0.04
Avail Cap(c_a), veh/h	491	898	902	1048	1429	1369	430	1685	1454	851	2091	1830
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.9	17.4	17.6	22.8	17.2	17.7	22.2	18.0	16.0	20.8	16.1	14.3
Incr Delay (d2), s/veh	2.0	0.3	0.3	2.5	0.9	0.9	3.0	1.0	0.0	2.6	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.9	0.9	1.4	2.7	2.7	2.0	2.9	0.2	2.8	2.8	0.2
LnGrp Delay(d),s/veh	25.9	17.6	17.8	25.2	18.1	18.7	25.2	19.0	16.0	23.5	16.8	14.4
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		184			507			364			430	
Approach Delay, s/veh		19.3			19.6			21.2			19.6	
Approach LOS		B			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.8	16.1	9.2	15.1	10.5	18.4	7.3	17.0
Change Period (Y+Rc), s	5.3	5.3	5.7	5.7	5.3	5.3	5.7	5.7
Max Green Setting (Gmax), s	24.7	47.7	30.3	25.3	11.7	60.7	14.3	41.3
Max Q Clear Time (g_c+I1), s	7.5	7.5	4.6	3.9	5.9	7.4	3.1	7.7
Green Ext Time (p_c), s	0.5	2.8	0.2	3.0	0.1	2.8	0.0	3.2

Intersection Summary	
HCM 2010 Ctrl Delay	20.0
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	17	145	260	30	32	174	424	147	27	357	64
Future Volume (vph)	50	17	145	260	30	32	174	424	147	27	357	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3273	1776	1481	3273	1776	1484	3273	3374	1474	1686	3374	1488
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3273	1776	1481	3273	1776	1484	3273	3374	1474	1686	3374	1488
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	56	19	161	289	33	36	193	471	163	30	397	71
RTOR Reduction (vph)	0	0	142	0	0	29	0	0	92	0	0	45
Lane Group Flow (vph)	56	19	19	289	33	7	193	471	71	30	397	26
Confl. Peds. (#/hr)	3		3	3		3	1		1	1		1
Confl. Bikes (#/hr)			2			2			2			2
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	2.3	6.3	6.3	7.1	11.1	11.1	5.1	23.6	23.6	0.9	19.4	19.4
Effective Green, g (s)	2.3	6.3	6.3	7.1	11.1	11.1	5.1	23.6	23.6	0.9	19.4	19.4
Actuated g/C Ratio	0.04	0.12	0.12	0.13	0.21	0.21	0.09	0.44	0.44	0.02	0.36	0.36
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	139	207	173	431	365	305	309	1477	645	28	1214	535
v/s Ratio Prot	0.02	0.01		c0.09	c0.02		c0.06	c0.14		0.02	0.12	
v/s Ratio Perm			0.01			0.00			0.05			0.02
v/c Ratio	0.40	0.09	0.11	0.67	0.09	0.02	0.62	0.32	0.11	1.07	0.33	0.05
Uniform Delay, d1	25.1	21.2	21.3	22.3	17.3	17.1	23.5	9.9	9.0	26.5	12.5	11.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.9	0.2	0.3	4.1	0.1	0.0	3.9	0.6	0.3	192.9	0.7	0.2
Delay (s)	27.0	21.4	21.6	26.4	17.4	17.1	27.4	10.5	9.3	219.4	13.2	11.4
Level of Service	C	C	C	C	B	B	C	B	A	F	B	B
Approach Delay (s)		22.9			24.6			14.2			25.4	
Approach LOS		C			C			B			C	

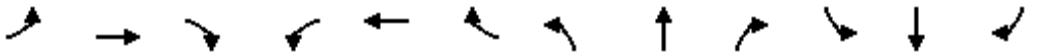
Intersection Summary			
HCM 2000 Control Delay	20.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	53.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	42.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	17	145	260	30	32	174	424	147	27	357	64
Future Volume (veh/h)	50	17	145	260	30	32	174	424	147	27	357	64
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776
Adj Flow Rate, veh/h	56	19	3	289	33	4	193	471	61	30	397	21
Adj No. of Lanes	2	1	1	2	1	1	2	2	1	1	2	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	146	139	115	419	286	238	303	1402	613	47	1184	522
Arrive On Green	0.04	0.08	0.08	0.13	0.16	0.16	0.09	0.42	0.42	0.03	0.35	0.35
Sat Flow, veh/h	3281	1776	1469	3281	1776	1479	3281	3374	1475	1691	3374	1488
Grp Volume(v), veh/h	56	19	3	289	33	4	193	471	61	30	397	21
Grp Sat Flow(s),veh/h/ln	1640	1776	1469	1640	1776	1479	1640	1687	1475	1691	1687	1488
Q Serve(g_s), s	0.8	0.5	0.1	3.8	0.7	0.1	2.6	4.3	1.1	0.8	3.9	0.4
Cycle Q Clear(g_c), s	0.8	0.5	0.1	3.8	0.7	0.1	2.6	4.3	1.1	0.8	3.9	0.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	146	139	115	419	286	238	303	1402	613	47	1184	522
V/C Ratio(X)	0.38	0.14	0.03	0.69	0.12	0.02	0.64	0.34	0.10	0.64	0.34	0.04
Avail Cap(c_a), veh/h	288	623	515	504	740	616	360	1402	613	185	1184	522
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.2	19.6	19.4	19.0	16.3	16.1	20.0	9.0	8.1	21.9	10.9	9.7
Incr Delay (d2), s/veh	1.6	0.4	0.1	3.1	0.2	0.0	2.8	0.6	0.3	13.6	0.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.2	0.0	1.9	0.4	0.0	1.3	2.1	0.5	0.5	1.9	0.2
LnGrp Delay(d),s/veh	22.8	20.0	19.5	22.1	16.5	16.1	22.7	9.7	8.4	35.5	11.6	9.9
LnGrp LOS	C	C	B	C	B	B	C	A	A	D	B	A
Approach Vol, veh/h		78			326			725			448	
Approach Delay, s/veh		22.0			21.5			13.1			13.2	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.3	22.9	9.8	7.6	8.2	20.0	6.0	11.3
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	16.0	7.0	16.0	5.0	16.0	4.0	19.0
Max Q Clear Time (g_c+I1), s	2.8	6.3	5.8	2.5	4.6	5.9	2.8	2.7
Green Ext Time (p_c), s	0.0	4.2	0.1	0.1	0.0	4.3	0.0	0.2

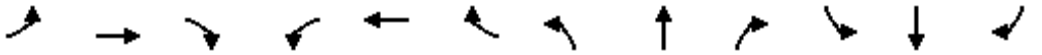
Intersection Summary	
HCM 2010 Ctrl Delay	15.3
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	142	0	254	475	491	0	0	388	374
Future Volume (vph)	0	0	0	142	0	254	475	491	0	0	388	374
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	2.7	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1687	1509	1687	1776			1776	1474
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1687	1509	1687	1776			1776	1474
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	158	0	282	528	546	0	0	431	416
RTOR Reduction (vph)	0	0	0	0	0	229	0	0	0	0	0	267
Lane Group Flow (vph)	0	0	0	0	158	53	528	546	0	0	431	149
Confl. Peds. (#/hr)							1		1	1		1
Confl. Bikes (#/hr)									1			1
Turn Type				Perm	NA	Perm	Prot	NA			NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases				8		8						6
Actuated Green, G (s)					12.8	12.8	20.6	48.9			24.3	24.3
Effective Green, g (s)					13.4	13.4	21.9	50.2			25.6	25.6
Actuated g/C Ratio					0.19	0.19	0.31	0.70			0.36	0.36
Clearance Time (s)					4.6	4.6	4.0	5.3			5.3	5.3
Vehicle Extension (s)					3.5	3.5	3.0	3.2			3.5	3.5
Lane Grp Cap (vph)					315	282	515	1245			634	527
v/s Ratio Prot							c0.31	0.31			c0.24	
v/s Ratio Perm					0.09	0.03						0.10
v/c Ratio					0.50	0.19	1.03	0.44			0.68	0.28
Uniform Delay, d1					26.1	24.5	24.8	4.6			19.5	16.4
Progression Factor					1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2					1.5	0.4	46.2	0.3			3.0	0.3
Delay (s)					27.6	24.9	71.1	4.9			22.5	16.8
Level of Service					C	C	E	A			C	B
Approach Delay (s)		0.0			25.9			37.4			19.7	
Approach LOS		A			C			D			B	

Intersection Summary			
HCM 2000 Control Delay	28.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	71.6	Sum of lost time (s)	10.7
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		

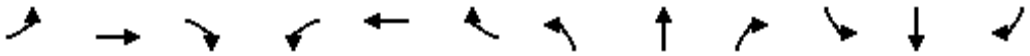
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	142	0	254	475	491	0	0	388	374
Future Volume (veh/h)	0	0	0	142	0	254	475	491	0	0	388	374
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1776	1776	1776	1776	0	0	1776	1776
Adj Flow Rate, veh/h				158	0	28	528	546	0	0	431	119
Adj No. of Lanes				0	1	1	1	1	0	0	1	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				7	7	7	7	7	0	0	7	7
Cap, veh/h				232	0	207	599	1288	0	0	577	479
Arrive On Green				0.14	0.00	0.14	0.35	0.73	0.00	0.00	0.32	0.32
Sat Flow, veh/h				1691	0	1509	1691	1776	0	0	1776	1475
Grp Volume(v), veh/h				158	0	28	528	546	0	0	431	119
Grp Sat Flow(s),veh/h/ln				1691	0	1509	1691	1776	0	0	1776	1475
Q Serve(g_s), s				5.2	0.0	1.0	17.1	7.1	0.0	0.0	12.6	3.5
Cycle Q Clear(g_c), s				5.2	0.0	1.0	17.1	7.1	0.0	0.0	12.6	3.5
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				232	0	207	599	1288	0	0	577	479
V/C Ratio(X)				0.68	0.00	0.14	0.88	0.42	0.00	0.00	0.75	0.25
Avail Cap(c_a), veh/h				598	0	534	618	1288	0	0	1197	995
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				23.9	0.0	22.1	17.7	3.2	0.0	0.0	17.5	14.4
Incr Delay (d2), s/veh				4.2	0.0	0.4	13.7	0.2	0.0	0.0	2.4	0.3
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.7	0.0	0.4	10.2	3.4	0.0	0.0	6.5	1.4
LnGrp Delay(d),s/veh				28.1	0.0	22.4	31.4	3.4	0.0	0.0	19.9	14.8
LnGrp LOS				C		C	C	A			B	B
Approach Vol, veh/h					186			1074			550	
Approach Delay, s/veh					27.2			17.2			18.8	
Approach LOS					C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		46.3			23.3	22.9		12.0
Change Period (Y+Rc), s		5.3			4.0	5.3		4.6
Max Green Setting (Gmax), s		38.0			20.0	38.0		20.0
Max Q Clear Time (g_c+I1), s		9.1			19.1	14.6		7.2
Green Ext Time (p_c), s		6.4			0.3	3.0		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	18.7
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	146	0	209	0	0	0	0	820	360	114	416	0
Future Volume (vph)	146	0	209	0	0	0	0	820	360	114	416	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Frpb, ped/bikes		1.00	1.00					1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1687	1509					1776	1477	1687	1776	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1687	1509					1776	1477	1687	1776	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	162	0	232	0	0	0	0	911	400	127	462	0
RTOR Reduction (vph)	0	0	189	0	0	0	0	0	104	0	0	0
Lane Group Flow (vph)	0	162	43	0	0	0	0	911	296	127	462	0
Confl. Peds. (#/hr)							1		1	1		1
Confl. Bikes (#/hr)									1			1
Turn Type	Perm	NA	Perm					NA	Perm	Prot	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2			
Actuated Green, G (s)		13.3	13.3					38.9	38.9	9.3	52.2	
Effective Green, g (s)		13.9	13.9					40.2	40.2	9.3	53.5	
Actuated g/C Ratio		0.18	0.18					0.53	0.53	0.12	0.71	
Clearance Time (s)		4.6	4.6					5.3	5.3	4.0	5.3	
Vehicle Extension (s)		3.6	3.6					2.8	2.8	3.0	2.8	
Lane Grp Cap (vph)		310	278					946	787	208	1260	
v/s Ratio Prot								c0.51		c0.08	0.26	
v/s Ratio Perm		0.10	0.03						0.20			
v/c Ratio		0.52	0.15					0.96	0.38	0.61	0.37	
Uniform Delay, d1		27.8	25.8					16.9	10.3	31.3	4.3	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.9	0.3					20.7	0.3	5.2	0.2	
Delay (s)		29.6	26.1					37.6	10.6	36.6	4.5	
Level of Service		C	C					D	B	D	A	
Approach Delay (s)		27.6			0.0			29.3			11.4	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	75.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	146	0	209	0	0	0	0	820	360	114	416	0
Future Volume (veh/h)	146	0	209	0	0	0	0	820	360	114	416	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1776	1776				0	1776	1776	1776	1776	0
Adj Flow Rate, veh/h	162	0	22				0	911	284	127	462	0
Adj No. of Lanes	0	1	1				0	1	1	1	1	0
Peak Hour Factor	0.90	0.90	0.90				0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	7	7	7				0	7	7	7	7	0
Cap, veh/h	235	0	210				0	1005	836	166	1296	0
Arrive On Green	0.14	0.00	0.14				0.00	0.57	0.57	0.10	0.73	0.00
Sat Flow, veh/h	1691	0	1509				0	1776	1477	1691	1776	0
Grp Volume(v), veh/h	162	0	22				0	911	284	127	462	0
Grp Sat Flow(s),veh/h/ln	1691	0	1509				0	1776	1477	1691	1776	0
Q Serve(g_s), s	5.6	0.0	0.8				0.0	27.9	6.3	4.5	5.8	0.0
Cycle Q Clear(g_c), s	5.6	0.0	0.8				0.0	27.9	6.3	4.5	5.8	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	235	0	210				0	1005	836	166	1296	0
V/C Ratio(X)	0.69	0.00	0.11				0.00	0.91	0.34	0.76	0.36	0.00
Avail Cap(c_a), veh/h	572	0	510				0	1145	952	555	1296	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	25.0	0.0	22.9				0.0	11.8	7.1	26.8	3.0	0.0
Incr Delay (d2), s/veh	4.5	0.0	0.3				0.0	9.5	0.2	7.1	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	0.0	0.3				0.0	16.1	2.6	2.4	2.7	0.0
LnGrp Delay(d),s/veh	29.5	0.0	23.2				0.0	21.3	7.3	33.9	3.2	0.0
LnGrp LOS	C		C					C	A	C	A	
Approach Vol, veh/h		184						1195			589	
Approach Delay, s/veh		28.7						18.0			9.8	
Approach LOS		C						B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	10.0	38.5		12.5		48.5		
Change Period (Y+Rc), s	4.0	5.3		4.6		5.3		
Max Green Setting (Gmax), s	20.0	38.0		20.0		38.0		
Max Q Clear Time (g_c+I1), s	6.5	29.9		7.6		7.8		
Green Ext Time (p_c), s	0.3	3.3		0.7		8.4		

Intersection Summary	
HCM 2010 Ctrl Delay	16.5
HCM 2010 LOS	B

Intersection	
Intersection Delay, s/veh	40.5
Intersection LOS	E

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	369	58	72	0	3	30	87	0	58	147	6
Future Vol, veh/h	0	369	58	72	0	3	30	87	0	58	147	6
Peak Hour Factor	0.88	0.82	0.82	0.82	0.88	0.82	0.82	0.82	0.88	0.82	0.82	0.82
Heavy Vehicles, %	7	0	5	4	7	0	0	0	7	7	12	0
Mvmt Flow	0	450	71	88	0	4	37	106	0	71	179	7
Number of Lanes	0	0	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	65.3	13.4	18.9
HCM LOS	F	B	C

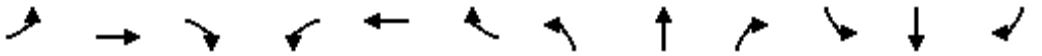
Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	27%	74%	100%	0%	24%
Vol Thru, %	70%	12%	0%	26%	36%
Vol Right, %	3%	14%	0%	74%	39%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	211	499	3	117	322
LT Vol	58	369	3	0	78
Through Vol	147	58	0	30	117
RT Vol	6	72	0	87	127
Lane Flow Rate	257	609	4	143	393
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.536	1	0.009	0.3	0.734
Departure Headway (Hd)	7.5	6.814	8.599	7.576	6.845
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	484	536	418	477	530
Service Time	5.514	4.839	6.317	5.294	4.845
HCM Lane V/C Ratio	0.531	1.136	0.01	0.3	0.742
HCM Control Delay	18.9	65.3	11.4	13.5	26.4
HCM Lane LOS	C	F	B	B	D
HCM 95th-tile Q	3.1	14	0	1.2	6.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	78	117	127
Future Vol, veh/h	0	78	117	127
Peak Hour Factor	0.88	0.82	0.82	0.82
Heavy Vehicles, %	7	0	4	5
Mvmt Flow	0	95	143	155
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	26.4
HCM LOS	D

Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	75	0	276	90	525	0	0	503	305
Future Volume (vph)	0	0	0	75	0	276	90	525	0	0	503	305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1687	1509	1687	1776			1776	1477
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1687	1509	1687	1776			1776	1477
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	83	0	307	100	583	0	0	559	339
RTOR Reduction (vph)	0	0	0	0	0	235	0	0	0	0	0	188
Lane Group Flow (vph)	0	0	0	0	83	72	100	583	0	0	559	151
Confl. Bikes (#/hr)									2			2
Turn Type				Perm	NA	Perm	Prot	NA			NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases				8		8						6
Actuated Green, G (s)					7.6	7.6	7.0	32.2			21.2	21.2
Effective Green, g (s)					8.5	8.5	7.0	33.1			22.1	22.1
Actuated g/C Ratio					0.17	0.17	0.14	0.67			0.45	0.45
Clearance Time (s)					4.9	4.9	4.0	4.9			4.9	4.9
Vehicle Extension (s)					0.2	0.2	3.0	0.2			0.2	0.2
Lane Grp Cap (vph)					289	258	238	1185			791	658
v/s Ratio Prot							0.06	c0.33			c0.31	
v/s Ratio Perm					0.05	0.05						0.10
v/c Ratio					0.29	0.28	0.42	0.49			0.71	0.23
Uniform Delay, d1					17.9	17.9	19.4	4.1			11.1	8.5
Progression Factor					1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2					0.2	0.2	1.2	0.1			2.4	0.1
Delay (s)					18.1	18.1	20.6	4.2			13.5	8.6
Level of Service					B	B	C	A			B	A
Approach Delay (s)		0.0			18.1			6.6			11.6	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	49.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	75	0	276	90	525	0	0	503	305
Future Volume (veh/h)	0	0	0	75	0	276	90	525	0	0	503	305
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1776	1776	1776	1776	0	0	1776	1776
Adj Flow Rate, veh/h				83	0	46	100	583	0	0	559	130
Adj No. of Lanes				0	1	1	1	1	0	0	1	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				7	7	7	7	7	0	0	7	7
Cap, veh/h				242	0	216	272	1140	0	0	663	551
Arrive On Green				0.14	0.00	0.14	0.16	0.64	0.00	0.00	0.37	0.37
Sat Flow, veh/h				1691	0	1509	1691	1776	0	0	1776	1476
Grp Volume(v), veh/h				83	0	46	100	583	0	0	559	130
Grp Sat Flow(s),veh/h/ln				1691	0	1509	1691	1776	0	0	1776	1476
Q Serve(g_s), s				1.6	0.0	1.0	2.0	6.5	0.0	0.0	10.7	2.3
Cycle Q Clear(g_c), s				1.6	0.0	1.0	2.0	6.5	0.0	0.0	10.7	2.3
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				242	0	216	272	1140	0	0	663	551
V/C Ratio(X)				0.34	0.00	0.21	0.37	0.51	0.00	0.00	0.84	0.24
Avail Cap(c_a), veh/h				1404	0	1253	682	1474	0	0	1474	1226
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				14.4	0.0	14.1	13.9	3.5	0.0	0.0	10.7	8.0
Incr Delay (d2), s/veh				0.3	0.0	0.2	0.8	0.1	0.0	0.0	1.1	0.1
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.8	0.0	0.4	1.0	3.1	0.0	0.0	5.3	0.9
LnGrp Delay(d),s/veh				14.7	0.0	14.3	14.7	3.7	0.0	0.0	11.8	8.1
LnGrp LOS				B		B	B	A			B	A
Approach Vol, veh/h					129			683			689	
Approach Delay, s/veh					14.5			5.3			11.1	
Approach LOS					B			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		27.9			10.0	17.9		9.3
Change Period (Y+Rc), s		4.9			4.0	4.9		4.9
Max Green Setting (Gmax), s		30.0			15.0	30.0		30.0
Max Q Clear Time (g_c+I1), s		8.5			4.0	12.7		3.6
Green Ext Time (p_c), s		0.3			0.2	0.3		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	8.8
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	151	0	112	0	0	0	0	464	40	246	332	0
Future Volume (vph)	151	0	112	0	0	0	0	464	40	246	332	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00		1.00	1.00	
Frpb, ped/bikes		1.00	1.00					1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00		1.00	1.00	
Frt		1.00	0.85					0.99		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1687	1509					1754		1687	1776	
Flt Permitted		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1687	1509					1754		1687	1776	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.88	0.90	0.88	0.90	0.90	0.90	0.90	0.88
Adj. Flow (vph)	168	0	124	0	0	0	0	516	44	273	369	0
RTOR Reduction (vph)	0	0	105	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	168	19	0	0	0	0	557	0	273	369	0
Confl. Bikes (#/hr)									2			
Turn Type	Perm	NA	Perm					NA		Prot	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4									
Actuated Green, G (s)		10.2	10.2					30.0		16.6	50.6	
Effective Green, g (s)		11.1	11.1					30.9		16.6	51.5	
Actuated g/C Ratio		0.16	0.16					0.44		0.24	0.73	
Clearance Time (s)		4.9	4.9					4.9		4.0	4.9	
Vehicle Extension (s)		0.2	0.2					0.2		3.0	0.2	
Lane Grp Cap (vph)		265	237					767		396	1295	
v/s Ratio Prot								c0.32		c0.16	0.21	
v/s Ratio Perm		0.10	0.01									
v/c Ratio		0.63	0.08					0.73		0.69	0.28	
Uniform Delay, d1		27.8	25.4					16.4		24.6	3.3	
Progression Factor		1.00	1.00					1.00		1.00	1.00	
Incremental Delay, d2		3.6	0.1					2.9		4.9	0.0	
Delay (s)		31.5	25.5					19.3		29.6	3.3	
Level of Service		C	C					B		C	A	
Approach Delay (s)		28.9			0.0			19.3			14.5	
Approach LOS		C			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	70.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	151	0	112	0	0	0	0	464	40	246	332	0
Future Volume (veh/h)	151	0	112	0	0	0	0	464	40	246	332	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1776	1776				0	1776	1900	1776	1776	0
Adj Flow Rate, veh/h	168	0	7				0	516	41	273	369	0
Adj No. of Lanes	0	1	1				0	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90				0.88	0.90	0.90	0.90	0.90	0.88
Percent Heavy Veh, %	7	7	7				0	7	7	7	7	0
Cap, veh/h	246	0	220				0	595	47	357	1190	0
Arrive On Green	0.12	0.00	0.15				0.00	0.37	0.35	0.21	0.67	0.00
Sat Flow, veh/h	1691	0	1509				0	1621	129	1691	1776	0
Grp Volume(v), veh/h	168	0	7				0	0	557	273	369	0
Grp Sat Flow(s),veh/h/ln	1691	0	1509				0	0	1750	1691	1776	0
Q Serve(g_s), s	4.1	0.0	0.2				0.0	0.0	12.8	6.6	3.8	0.0
Cycle Q Clear(g_c), s	4.1	0.0	0.2				0.0	0.0	12.8	6.6	3.8	0.0
Prop In Lane	1.00		1.00				0.00		0.07	1.00		0.00
Lane Grp Cap(c), veh/h	246	0	220				0	0	643	357	1190	0
V/C Ratio(X)	0.68	0.00	0.03				0.00	0.00	0.87	0.77	0.31	0.00
Avail Cap(c_a), veh/h	1204	0	1074				0	0	1245	974	1264	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	18.0	0.0	15.9				0.0	0.0	12.8	16.1	3.0	0.0
Incr Delay (d2), s/veh	1.2	0.0	0.0				0.0	0.0	1.4	3.5	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	0.1				0.0	0.0	6.3	3.4	1.8	0.0
LnGrp Delay(d),s/veh	19.3	0.0	15.9				0.0	0.0	14.2	19.6	3.0	0.0
LnGrp LOS	B		B						B	B	A	
Approach Vol, veh/h		175						557			642	
Approach Delay, s/veh		19.2						14.2			10.1	
Approach LOS		B						B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	13.2	19.9		10.3		33.1		
Change Period (Y+Rc), s	4.0	4.9		4.9		4.9		
Max Green Setting (Gmax), s	25.0	30.0		30.0		30.0		
Max Q Clear Time (g_c+I1), s	8.6	14.8		6.1		5.8		
Green Ext Time (p_c), s	0.9	0.2		0.0		0.2		

Intersection Summary	
HCM 2010 Ctrl Delay	12.9
HCM 2010 LOS	B



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	12	200	291	21	193	252
Future Volume (vph)	12	200	291	21	193	252
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.88	0.95	1.00	0.97	0.95
Frpb, ped/bikes	1.00	0.98	1.00	0.99	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3273	2597	3374	1491	3273	3374
Flt Permitted	0.95	1.00	1.00	1.00	0.56	1.00
Satd. Flow (perm)	3273	2597	3374	1491	1916	3374
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	13	222	323	23	214	280
RTOR Reduction (vph)	0	188	0	9	0	0
Lane Group Flow (vph)	13	34	323	14	214	280
Confl. Bikes (#/hr)		1		1		
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	5.1	5.1	20.5	20.5	20.5	20.5
Effective Green, g (s)	5.1	5.1	20.5	20.5	20.5	20.5
Actuated g/C Ratio	0.15	0.15	0.61	0.61	0.61	0.61
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	496	394	2058	909	1168	2058
v/s Ratio Prot	0.00		0.10			0.08
v/s Ratio Perm		c0.01		0.01	c0.11	
v/c Ratio	0.03	0.09	0.16	0.02	0.18	0.14
Uniform Delay, d1	12.1	12.2	2.8	2.6	2.9	2.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.1	0.2	0.0	0.3	0.1
Delay (s)	12.2	12.3	3.0	2.6	3.2	2.9
Level of Service	B	B	A	A	A	A
Approach Delay (s)	12.3		3.0			3.1
Approach LOS	B		A			A

Intersection Summary			
HCM 2000 Control Delay	5.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	33.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	32.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	12	200	291	21	193	252
Future Volume (veh/h)	12	200	291	21	193	252
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		0.98	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776	1776	1776	1776
Adj Flow Rate, veh/h	13	13	323	13	214	280
Adj No. of Lanes	2	2	2	1	2	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	7	7	7	7	7	7
Cap, veh/h	87	70	2190	959	1761	2190
Arrive On Green	0.03	0.03	0.65	0.65	0.65	0.65
Sat Flow, veh/h	3281	2656	3463	1478	1923	3463
Grp Volume(v), veh/h	13	13	323	13	214	280
Grp Sat Flow(s),veh/h/ln	1640	1328	1687	1478	962	1687
Q Serve(g_s), s	0.1	0.1	0.9	0.1	1.2	0.8
Cycle Q Clear(g_c), s	0.1	0.1	0.9	0.1	2.1	0.8
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	87	70	2190	959	1761	2190
V/C Ratio(X)	0.15	0.18	0.15	0.01	0.12	0.13
Avail Cap(c_a), veh/h	2129	1724	2190	959	1761	2190
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.7	11.7	1.7	1.5	2.1	1.7
Incr Delay (d2), s/veh	0.8	1.3	0.1	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.1	0.4	0.0	0.3	0.4
LnGrp Delay(d),s/veh	12.5	13.0	1.8	1.6	2.2	1.8
LnGrp LOS	B	B	A	A	A	A
Approach Vol, veh/h	26		336			494
Approach Delay, s/veh	12.8		1.8			2.0
Approach LOS	B		A			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		20.0				20.0		4.7
Change Period (Y+Rc), s		4.0				4.0		4.0
Max Green Setting (Gmax), s		16.0				16.0		16.0
Max Q Clear Time (g_c+I1), s		2.9				4.1		2.1
Green Ext Time (p_c), s		4.3				4.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	2.2
HCM 2010 LOS	A

Notes

User approved ignoring U-Turning movement.

Intersection	
Intersection Delay, s/veh	12.7
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	90	153	4	0	24	92	116	0	11	119	22
Future Vol, veh/h	0	90	153	4	0	24	92	116	0	11	119	22
Peak Hour Factor	0.88	0.86	0.86	0.86	0.88	0.86	0.86	0.86	0.88	0.86	0.86	0.86
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	0	105	178	5	0	28	107	135	0	13	138	26
Number of Lanes	0	1	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	2	2
HCM Control Delay	12.1	12.9	13.1
HCM LOS	B	B	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	7%	100%	0%	100%	0%	40%	0%
Vol Thru, %	78%	0%	97%	0%	44%	60%	0%
Vol Right, %	14%	0%	3%	0%	56%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	152	90	157	24	208	172	48
LT Vol	11	90	0	24	0	69	0
Through Vol	119	0	153	0	92	103	0
RT Vol	22	0	4	0	116	0	48
Lane Flow Rate	177	105	183	28	242	200	56
Geometry Grp	6	7	7	7	7	7	7
Degree of Util (X)	0.33	0.203	0.328	0.055	0.412	0.379	0.092
Departure Headway (Hd)	6.72	6.991	6.463	7.038	6.131	6.82	5.905
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	532	511	553	507	583	526	603
Service Time	4.801	4.766	4.239	4.814	3.907	4.595	3.679
HCM Lane V/C Ratio	0.333	0.205	0.331	0.055	0.415	0.38	0.093
HCM Control Delay	13.1	11.6	12.4	10.2	13.2	13.7	9.3
HCM Lane LOS	B	B	B	B	B	B	A
HCM 95th-tile Q	1.4	0.8	1.4	0.2	2	1.8	0.3

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	69	103	48
Future Vol, veh/h	0	69	103	48
Peak Hour Factor	0.88	0.86	0.86	0.86
Heavy Vehicles, %	7	7	7	7
Mvmt Flow	0	80	120	56
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	12.7
HCM LOS	B

Lane

Intersection	
Intersection Delay, s/veh	12.1
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	47	101	50	0	83	34	32	0	0	145	160
Future Vol, veh/h	0	47	101	50	0	83	34	32	0	0	145	160
Peak Hour Factor	0.88	0.90	0.90	0.90	0.88	0.90	0.90	0.90	0.88	0.90	0.90	0.90
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	0	52	112	56	0	92	38	36	0	0	161	178
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	11	10.4	14.5
HCM LOS	B	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	0%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	100%	48%	0%	67%	0%	52%	0%	83%
Vol Right, %	0%	52%	0%	33%	0%	48%	0%	17%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	305	47	151	83	66	45	70
LT Vol	0	0	47	0	83	0	45	0
Through Vol	0	145	0	101	0	34	0	58
RT Vol	0	160	0	50	0	32	0	12
Lane Flow Rate	0	339	52	168	92	73	50	78
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0	0.529	0.099	0.282	0.176	0.123	0.094	0.133
Departure Headway (Hd)	5.991	5.62	6.793	6.05	6.878	6.024	6.796	6.167
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	0	641	527	594	521	594	527	580
Service Time	3.728	3.357	4.534	3.791	4.623	3.769	4.544	3.915
HCM Lane V/C Ratio	0	0.529	0.099	0.283	0.177	0.123	0.095	0.134
HCM Control Delay	8.7	14.5	10.3	11.2	11.1	9.6	10.3	9.9
HCM Lane LOS	N	B	B	B	B	A	B	A
HCM 95th-tile Q	0	3.1	0.3	1.2	0.6	0.4	0.3	0.5

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	45	58	12
Future Vol, veh/h	0	45	58	12
Peak Hour Factor	0.88	0.90	0.90	0.90
Heavy Vehicles, %	7	7	7	7
Mvmt Flow	0	50	64	13
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	10.1
HCM LOS	B

Lane

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	1	163	0	0	17	87	20	0	1	72	54
Future Vol, veh/h	0	1	163	0	0	17	87	20	0	1	72	54
Peak Hour Factor	0.88	0.90	0.90	0.90	0.88	0.90	0.90	0.90	0.88	0.90	0.90	0.90
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	0	1	181	0	0	19	97	22	0	1	80	60
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	9.8	8.9	9.2
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	57%	0%	100%	0%	81%	0%	89%
Vol Right, %	0%	43%	0%	0%	0%	19%	0%	11%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	1	126	1	163	17	107	1	28
LT Vol	1	0	1	0	17	0	1	0
Through Vol	0	72	0	163	0	87	0	25
RT Vol	0	54	0	0	0	20	0	3
Lane Flow Rate	1	140	1	181	19	119	1	31
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.002	0.201	0.002	0.262	0.03	0.169	0.002	0.048
Departure Headway (Hd)	5.981	5.176	5.712	5.21	5.756	5.122	6.108	5.528
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	598	693	626	690	622	699	585	646
Service Time	3.72	2.915	3.447	2.944	3.493	2.859	3.856	3.276
HCM Lane V/C Ratio	0.002	0.202	0.002	0.262	0.031	0.17	0.002	0.048
HCM Control Delay	8.7	9.2	8.5	9.8	8.7	8.9	8.9	8.6
HCM Lane LOS	A	A	A	A	A	A	A	A
HCM 95th-tile Q	0	0.7	0	1	0.1	0.6	0	0.2

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	1	25	3
Future Vol, veh/h	0	1	25	3
Peak Hour Factor	0.88	0.90	0.90	0.90
Heavy Vehicles, %	7	7	7	7
Mvmt Flow	0	1	28	3
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	8.6
HCM LOS	A

Lane

Intersection	
Intersection Delay, s/veh	8.3
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	82	0	0	0	0	0	0	0	0	0	0
Future Vol, veh/h	0	82	0	0	0	0	0	0	0	0	0	0
Peak Hour Factor	0.88	0.90	0.90	0.90	0.88	0.90	0.90	0.90	0.88	0.90	0.90	0.90
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	0	91	0	0	0	0	0	0	0	0	0	0
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	8.7	0	0
HCM LOS	A	-	-

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	0%	0%	100%	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	0%	100%	100%	100%	100%	0%
Vol Right, %	0%	0%	0%	0%	0%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	82	0	0	0	0	25
LT Vol	0	0	82	0	0	0	0	0
Through Vol	0	0	0	0	0	0	0	0
RT Vol	0	0	0	0	0	0	0	25
Lane Flow Rate	0	0	91	0	0	0	0	28
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0	0	0.131	0	0	0	0	0.031
Departure Headway (Hd)	4.899	4.899	5.169	4.668	4.714	4.714	4.779	4.078
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	0	0	696	0	0	0	0	862
Service Time	2.599	2.599	2.881	2.38	2.454	2.454	2.578	1.877
HCM Lane V/C Ratio	0	0	0.131	0	0	0	0	0.032
HCM Control Delay	7.6	7.6	8.7	7.4	7.5	7.5	7.6	7
HCM Lane LOS	N	N	A	N	N	N	N	A
HCM 95th-tile Q	0	0	0.4	0	0	0	0	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	0	0	25
Future Vol, veh/h	0	0	0	25
Peak Hour Factor	0.88	0.90	0.90	0.90
Heavy Vehicles, %	7	7	7	7
Mvmt Flow	0	0	0	28
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	7
HCM LOS	A

Lane

Intersection	
Intersection Delay, s/veh	46.6
Intersection LOS	E

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	42	311	281	0	111	184	146	0	230	64	22
Future Vol, veh/h	0	42	311	281	0	111	184	146	0	230	64	22
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	0	45	331	299	0	118	196	155	0	245	68	23
Number of Lanes	0	1	1	0	0	1	1	1	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	3	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	3
HCM Control Delay	72	17.5	46.8
HCM LOS	F	C	E

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1
Vol Left, %	73%	100%	0%	100%	0%	0%	49%
Vol Thru, %	20%	0%	53%	0%	100%	0%	42%
Vol Right, %	7%	0%	47%	0%	0%	100%	9%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	316	42	592	111	184	146	276
LT Vol	230	42	0	111	0	0	136
Through Vol	64	0	311	0	184	0	116
RT Vol	22	0	281	0	0	146	24
Lane Flow Rate	336	45	630	118	196	155	294
Geometry Grp	7	8	8	7	7	7	7
Degree of Util (X)	0.853	0.124	1	0.309	0.484	0.354	0.749
Departure Headway (Hd)	9.135	9.954	9.077	9.406	8.902	8.198	9.186
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	397	359	403	383	405	438	393
Service Time	6.881	7.744	6.866	7.165	6.662	5.957	6.934
HCM Lane V/C Ratio	0.846	0.125	1.563	0.308	0.484	0.354	0.748
HCM Control Delay	46.8	14.2	76.1	16.3	19.8	15.4	34.8
HCM Lane LOS	E	B	F	C	C	C	D
HCM 95th-tile Q	8.2	0.4	12.1	1.3	2.6	1.6	6

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	136	116	24
Future Vol, veh/h	0	136	116	24
Peak Hour Factor	0.94	0.94	0.94	0.94
Heavy Vehicles, %	4	4	4	4
Mvmt Flow	0	145	123	26
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	3
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	34.8
HCM LOS	D

Lane

Intersection	
Intersection Delay, s/veh	26.9
Intersection LOS	D

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	95	145	1	0	57	281	119	0	0	33	21	0	141	54	165
Future Vol, veh/h	0	95	145	1	0	57	281	119	0	0	33	21	0	141	54	165
Peak Hour Factor	0.88	0.87	0.87	0.87	0.88	0.87	0.87	0.87	0.88	0.87	0.87	0.87	0.88	0.87	0.87	0.87
Heavy Vehicles, %	7	0	1	0	7	0	1	3	7	0	0	0	7	0	0	0
Mvmt Flow	0	109	167	1	0	66	323	137	0	0	38	24	0	162	62	190
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	16.5	36.5	11.5	24
HCM LOS	C	E	B	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	39%	12%	39%
Vol Thru, %	61%	60%	61%	15%
Vol Right, %	39%	0%	26%	46%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	54	241	457	360
LT Vol	0	95	57	141
Through Vol	33	145	281	54
RT Vol	21	1	119	165
Lane Flow Rate	62	277	525	414
Geometry Grp	1	1	1	1
Degree of Util (X)	0.126	0.51	0.87	0.721
Departure Headway (Hd)	7.3	6.628	5.965	6.273
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	487	543	604	575
Service Time	5.398	4.698	4.021	4.331
HCM Lane V/C Ratio	0.127	0.51	0.869	0.72
HCM Control Delay	11.5	16.5	36.5	24
HCM Lane LOS	B	C	E	C
HCM 95th-tile Q	0.4	2.9	9.9	6



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	367	140	195	241	211	62	354	207	189	363	57
Future Volume (veh/h)	115	367	140	195	241	211	62	354	207	189	363	57
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1853	1900	1863	1900	1900	1759	1881	1863	1881	1881	1759
Adj Flow Rate, veh/h	132	422	132	224	277	120	71	407	92	217	417	20
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	1	2	2	2	0	0	8	1	2	1	1	8
Cap, veh/h	193	594	184	291	695	292	112	543	451	277	709	563
Arrive On Green	0.11	0.23	0.21	0.16	0.28	0.27	0.07	0.29	0.29	0.15	0.38	0.38
Sat Flow, veh/h	1792	2624	811	1774	2458	1034	1675	1881	1563	1792	1881	1495
Grp Volume(v), veh/h	132	281	273	224	201	196	71	407	92	217	417	20
Grp Sat Flow(s),veh/h/ln	1792	1760	1675	1774	1805	1687	1675	1881	1563	1792	1881	1495
Q Serve(g_s), s	6.8	14.2	14.6	11.6	8.7	9.2	4.0	18.9	4.3	11.2	17.1	0.8
Cycle Q Clear(g_c), s	6.8	14.2	14.6	11.6	8.7	9.2	4.0	18.9	4.3	11.2	17.1	0.8
Prop In Lane	1.00		0.48	1.00		0.61	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	193	398	379	291	510	477	112	543	451	277	709	563
V/C Ratio(X)	0.68	0.71	0.72	0.77	0.39	0.41	0.63	0.75	0.20	0.78	0.59	0.04
Avail Cap(c_a), veh/h	297	493	469	589	805	752	226	956	794	483	1210	962
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.4	34.3	34.9	38.5	27.9	28.5	43.8	31.1	25.9	39.2	24.1	19.0
Incr Delay (d2), s/veh	4.2	3.5	4.0	4.3	0.5	0.6	5.8	2.1	0.2	4.8	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	7.3	7.1	6.1	4.4	4.4	2.0	10.2	1.9	5.9	9.0	0.3
LnGrp Delay(d),s/veh	45.6	37.8	38.9	42.8	28.4	29.1	49.7	33.2	26.1	44.0	24.8	19.0
LnGrp LOS	D	D	D	D	C	C	D	C	C	D	C	B
Approach Vol, veh/h		686			621			570			654	
Approach Delay, s/veh		39.7			33.8			34.1			31.0	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.9	31.8	19.8	25.8	10.4	40.3	14.4	31.2
Change Period (Y+Rc), s	5.3	5.3	5.7	5.7	5.3	5.3	5.7	5.7
Max Green Setting (Gmax), s	24.7	47.7	30.3	25.3	11.7	60.7	14.3	41.3
Max Q Clear Time (g_c+I1), s	13.2	20.9	13.6	16.6	6.0	19.1	8.8	11.2
Green Ext Time (p_c), s	0.4	5.6	0.5	3.5	0.1	5.9	0.1	5.9

Intersection Summary	
HCM 2010 Ctrl Delay	34.8
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	285	111	431	109	106	16	536	439	204	30	456	263
Future Volume (veh/h)	285	111	431	109	106	16	536	439	204	30	456	263
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827
Adj Flow Rate, veh/h	303	118	162	116	113	2	570	467	93	32	485	74
Adj No. of Lanes	2	1	1	2	1	1	2	2	1	1	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	361	316	263	201	229	190	663	1576	689	49	991	437
Arrive On Green	0.11	0.17	0.17	0.06	0.13	0.13	0.20	0.45	0.45	0.03	0.29	0.29
Sat Flow, veh/h	3375	1827	1522	3375	1827	1518	3375	3471	1518	1740	3471	1530
Grp Volume(v), veh/h	303	118	162	116	113	2	570	467	93	32	485	74
Grp Sat Flow(s),veh/h/ln	1688	1827	1522	1688	1827	1518	1688	1736	1518	1740	1736	1530
Q Serve(g_s), s	4.9	3.2	5.5	1.9	3.2	0.1	9.1	4.8	2.0	1.0	6.5	2.0
Cycle Q Clear(g_c), s	4.9	3.2	5.5	1.9	3.2	0.1	9.1	4.8	2.0	1.0	6.5	2.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	361	316	263	201	229	190	663	1576	689	49	991	437
V/C Ratio(X)	0.84	0.37	0.62	0.58	0.49	0.01	0.86	0.30	0.14	0.66	0.49	0.17
Avail Cap(c_a), veh/h	361	554	462	301	522	433	663	1576	689	155	991	437
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.5	20.5	21.4	25.7	22.8	21.5	21.8	9.7	8.9	27.0	16.6	15.0
Incr Delay (d2), s/veh	15.8	0.7	2.3	2.6	1.6	0.0	11.1	0.5	0.4	14.0	1.7	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	1.7	2.5	0.9	1.7	0.0	5.3	2.4	0.9	0.7	3.3	0.9
LnGrp Delay(d),s/veh	40.4	21.2	23.8	28.2	24.5	21.5	32.8	10.1	9.3	41.0	18.3	15.9
LnGrp LOS	D	C	C	C	C	C	C	B	A	D	B	B
Approach Vol, veh/h		583			231			1130			591	
Approach Delay, s/veh		31.9			26.3			21.5			19.3	
Approach LOS		C			C			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.6	29.4	7.3	13.7	15.0	20.0	10.0	11.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.6	22.0	5.0	17.0	11.0	16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s	3.0	6.8	3.9	7.5	11.1	8.5	6.9	5.2
Green Ext Time (p_c), s	0.0	6.3	0.0	1.3	0.0	4.0	0.0	1.4

Intersection Summary	
HCM 2010 Ctrl Delay	23.8
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	387	0	345	312	834	0	0	717	279
Future Volume (veh/h)	0	0	0	387	0	345	312	834	0	0	717	279
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1827	1827	1827	1827	0	0	1827	1827
Adj Flow Rate, veh/h				412	0	200	332	887	0	0	763	118
Adj No. of Lanes				0	1	1	1	1	0	0	1	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %				4	4	4	4	4	0	0	4	4
Cap, veh/h				395	0	353	386	1251	0	0	791	658
Arrive On Green				0.23	0.00	0.23	0.22	0.68	0.00	0.00	0.43	0.43
Sat Flow, veh/h				1740	0	1553	1740	1827	0	0	1827	1519
Grp Volume(v), veh/h				412	0	200	332	887	0	0	763	118
Grp Sat Flow(s),veh/h/ln				1740	0	1553	1740	1827	0	0	1827	1519
Q Serve(g_s), s				20.6	0.0	10.4	16.6	27.0	0.0	0.0	36.9	4.3
Cycle Q Clear(g_c), s				20.6	0.0	10.4	16.6	27.0	0.0	0.0	36.9	4.3
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				395	0	353	386	1251	0	0	791	658
V/C Ratio(X)				1.04	0.00	0.57	0.86	0.71	0.00	0.00	0.96	0.18
Avail Cap(c_a), veh/h				395	0	353	408	1251	0	0	791	658
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				35.1	0.0	31.1	33.9	8.8	0.0	0.0	25.0	15.8
Incr Delay (d2), s/veh				57.0	0.0	2.4	16.1	1.9	0.0	0.0	23.6	0.2
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				16.0	0.0	4.7	9.7	14.0	0.0	0.0	23.6	1.8
LnGrp Delay(d),s/veh				92.0	0.0	33.5	50.0	10.7	0.0	0.0	48.6	16.0
LnGrp LOS				F		C	D	B			D	B
Approach Vol, veh/h					612			1219			881	
Approach Delay, s/veh					72.9			21.4			44.3	
Approach LOS					E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		66.1			22.8	43.3		24.6
Change Period (Y+Rc), s		5.3			4.0	5.3		4.6
Max Green Setting (Gmax), s		38.0			20.0	38.0		20.0
Max Q Clear Time (g_c+I1), s		29.0			18.6	38.9		22.6
Green Ext Time (p_c), s		6.3			0.2	0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	40.4
HCM 2010 LOS	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	499	0	612	0	0	0	0	647	269	318	786	0
Future Volume (veh/h)	499	0	612	0	0	0	0	647	269	318	786	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1827				0	1827	1827	1827	1827	0
Adj Flow Rate, veh/h	531	0	487				0	688	149	338	836	0
Adj No. of Lanes	0	1	1				0	1	1	1	1	0
Peak Hour Factor	0.94	0.94	0.94				0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4				0	4	4	4	4	0
Cap, veh/h	412	0	367				0	751	624	374	1227	0
Arrive On Green	0.24	0.00	0.24				0.00	0.41	0.41	0.21	0.67	0.00
Sat Flow, veh/h	1740	0	1553				0	1827	1519	1740	1827	0
Grp Volume(v), veh/h	531	0	487				0	688	149	338	836	0
Grp Sat Flow(s),veh/h/ln	1740	0	1553				0	1827	1519	1740	1827	0
Q Serve(g_s), s	20.6	0.0	20.6				0.0	31.0	5.6	16.5	24.1	0.0
Cycle Q Clear(g_c), s	20.6	0.0	20.6				0.0	31.0	5.6	16.5	24.1	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	412	0	367				0	751	624	374	1227	0
V/C Ratio(X)	1.29	0.00	1.33				0.00	0.92	0.24	0.90	0.68	0.00
Avail Cap(c_a), veh/h	412	0	367				0	824	685	400	1227	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	33.2	0.0	33.2				0.0	24.2	16.8	33.3	8.7	0.0
Incr Delay (d2), s/veh	147.8	0.0	164.4				0.0	14.0	0.2	22.7	1.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.7	0.0	25.6				0.0	18.4	2.3	10.2	12.6	0.0
LnGrp Delay(d),s/veh	181.1	0.0	197.7				0.0	38.3	16.9	56.0	10.2	0.0
LnGrp LOS	F		F					D	B	E	B	
Approach Vol, veh/h		1018						837			1174	
Approach Delay, s/veh		189.0						34.5			23.4	
Approach LOS		F						C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	12.7	39.8		24.6		62.5		
Change Period (Y+Rc), s	4.0	5.3		4.6		5.3		
Max Green Setting (Gmax), s	20.0	38.0		20.0		38.0		
Max Q Clear Time (g_c+I1), s	10.5	33.0		22.6		26.1		
Green Ext Time (p_c), s	0.2	1.5		0.0		5.7		

Intersection Summary	
HCM 2010 Ctrl Delay	82.1
HCM 2010 LOS	F

Intersection	
Int Delay, s/veh	473.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	432	6	81	6	9	75	47	409	8	93	721	584
Future Vol, veh/h	432	6	81	6	9	75	47	409	8	93	721	584
Conflicting Peds, #/hr	1	0	1	1	0	1	1	0	1	1	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	340	-	0	210	-	210	175	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	460	6	86	6	10	80	50	435	9	99	767	621

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1507	1502	769	1505	1502	437	768	0	0	436	0	0
Stage 1	966	966	-	536	536	-	-	-	-	-	-	-
Stage 2	541	536	-	969	966	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.236	-	-	2.236	-	-
Pot Cap-1 Maneuver	~ 98	120	398	99	120	615	837	-	-	1113	-	-
Stage 1	~ 303	330	-	525	520	-	-	-	-	-	-	-
Stage 2	522	520	-	302	330	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 70	103	397	66	103	614	836	-	-	1112	-	-
Mov Cap-2 Maneuver	~ 70	103	-	66	103	-	-	-	-	-	-	-
Stage 1	~ 285	300	-	493	488	-	-	-	-	-	-	-
Stage 2	~ 418	488	-	211	300	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 2248.3	18.5	1	0.6
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBL	SBT	SBR
Capacity (veh/h)	836	-	-	70	397	66	103	614	1112	-	-
HCM Lane V/C Ratio	0.06	-	-	6.657	0.217	0.097	0.093	0.13	0.089	-	-
HCM Control Delay (s)	9.6	-	-	$ 2661	16.6	65.3	43.5	11.7	8.6	-	-
HCM Lane LOS	A	-	-	F	C	F	E	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	52.8	0.8	0.3	0.3	0.4	0.3	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Intersection Delay, s/veh	47.1
Intersection LOS	E

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	224	90	51	0	15	83	111	0	34	145	10
Future Vol, veh/h	0	224	90	51	0	15	83	111	0	34	145	10
Peak Hour Factor	0.88	0.87	0.87	0.87	0.88	0.87	0.87	0.87	0.88	0.87	0.87	0.87
Heavy Vehicles, %	7	1	0	4	7	7	0	1	7	3	4	0
Mvmt Flow	0	257	103	59	0	17	95	128	0	39	167	11
Number of Lanes	0	0	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	41.4	17.8	18.4
HCM LOS	E	C	C

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	18%	61%	100%	0%	24%
Vol Thru, %	77%	25%	0%	43%	29%
Vol Right, %	5%	14%	0%	57%	47%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	189	365	15	194	725
LT Vol	34	224	15	0	174
Through Vol	145	90	0	83	211
RT Vol	10	51	0	111	340
Lane Flow Rate	217	420	17	223	833
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.485	0.86	0.043	0.494	1
Departure Headway (Hd)	8.042	7.501	8.994	7.974	6.953
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	450	487	400	455	525
Service Time	6.059	5.501	6.71	5.69	4.981
HCM Lane V/C Ratio	0.482	0.862	0.043	0.49	1.587
HCM Control Delay	18.4	41.4	12.1	18.2	66
HCM Lane LOS	C	E	B	C	F
HCM 95th-tile Q	2.6	8.9	0.1	2.7	13.9

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	174	211	340
Future Vol, veh/h	0	174	211	340
Peak Hour Factor	0.88	0.87	0.87	0.87
Heavy Vehicles, %	7	2	7	2
Mvmt Flow	0	200	243	391
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	66
HCM LOS	F

Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	95	0	303	124	768	0	0	622	198
Future Volume (veh/h)	0	0	0	95	0	303	124	768	0	0	622	198
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1827	1827	1827	1827	0	0	1827	1827
Adj Flow Rate, veh/h				106	0	206	138	853	0	0	691	96
Adj No. of Lanes				0	1	1	1	1	0	0	1	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				4	4	4	4	4	0	0	4	4
Cap, veh/h				324	0	289	227	1169	0	0	772	642
Arrive On Green				0.19	0.00	0.19	0.13	0.64	0.00	0.00	0.42	0.42
Sat Flow, veh/h				1740	0	1553	1740	1827	0	0	1827	1519
Grp Volume(v), veh/h				106	0	206	138	853	0	0	691	96
Grp Sat Flow(s),veh/h/ln				1740	0	1553	1740	1827	0	0	1827	1519
Q Serve(g_s), s				2.4	0.0	5.7	3.4	14.5	0.0	0.0	16.2	1.8
Cycle Q Clear(g_c), s				2.4	0.0	5.7	3.4	14.5	0.0	0.0	16.2	1.8
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				324	0	289	227	1169	0	0	772	642
V/C Ratio(X)				0.33	0.00	0.71	0.61	0.73	0.00	0.00	0.90	0.15
Avail Cap(c_a), veh/h				1169	0	1043	568	1228	0	0	1228	1021
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				16.2	0.0	17.6	18.9	5.6	0.0	0.0	12.3	8.2
Incr Delay (d2), s/veh				0.2	0.0	1.2	2.6	1.8	0.0	0.0	3.6	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.2	0.0	2.6	1.8	7.7	0.0	0.0	8.8	0.8
LnGrp Delay(d),s/veh				16.4	0.0	18.8	21.5	7.4	0.0	0.0	16.0	8.2
LnGrp LOS				B		B	C	A			B	A
Approach Vol, veh/h					312			991			787	
Approach Delay, s/veh					18.0			9.4			15.0	
Approach LOS					B			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		33.4			10.0	23.4		12.6
Change Period (Y+Rc), s		4.9			4.0	4.9		4.9
Max Green Setting (Gmax), s		30.0			15.0	30.0		30.0
Max Q Clear Time (g_c+I1), s		16.5			5.4	18.2		7.7
Green Ext Time (p_c), s		0.4			0.3	0.4		0.1

Intersection Summary		
HCM 2010 Ctrl Delay		12.8
HCM 2010 LOS		B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	419	0	247	0	0	0	0	473	71	179	538	0
Future Volume (veh/h)	419	0	247	0	0	0	0	473	71	179	538	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1827				0	1827	1900	1827	1827	0
Adj Flow Rate, veh/h	466	0	68				0	526	75	199	598	0
Adj No. of Lanes	0	1	1				0	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90				0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	4				0	4	4	4	4	0
Cap, veh/h	525	0	468				0	574	82	257	1053	0
Arrive On Green	0.30	0.00	0.30				0.00	0.37	0.35	0.15	0.58	0.00
Sat Flow, veh/h	1740	0	1553				0	1559	222	1740	1827	0
Grp Volume(v), veh/h	466	0	68				0	0	601	199	598	0
Grp Sat Flow(s),veh/h/ln	1740	0	1553				0	0	1782	1740	1827	0
Q Serve(g_s), s	16.8	0.0	2.1				0.0	0.0	21.1	7.2	13.5	0.0
Cycle Q Clear(g_c), s	16.8	0.0	2.1				0.0	0.0	21.1	7.2	13.5	0.0
Prop In Lane	1.00		1.00				0.00		0.12	1.00		0.00
Lane Grp Cap(c), veh/h	525	0	468				0	0	656	257	1053	0
V/C Ratio(X)	0.89	0.00	0.15				0.00	0.00	0.92	0.78	0.57	0.00
Avail Cap(c_a), veh/h	820	0	732				0	0	840	929	1053	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	21.8	0.0	16.7				0.0	0.0	19.8	26.9	8.7	0.0
Incr Delay (d2), s/veh	5.1	0.0	0.1				0.0	0.0	11.1	5.0	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.8	0.0	0.9				0.0	0.0	12.4	3.8	6.8	0.0
LnGrp Delay(d),s/veh	26.9	0.0	16.8				0.0	0.0	30.9	31.9	9.2	0.0
LnGrp LOS	C		B						C	C	A	
Approach Vol, veh/h		534						601			797	
Approach Delay, s/veh		25.7						30.9			14.9	
Approach LOS		C						C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	13.7	28.1		23.8		41.8		
Change Period (Y+Rc), s	4.0	4.9		4.9		4.9		
Max Green Setting (Gmax), s	35.0	30.0		30.0		30.0		
Max Q Clear Time (g_c+I1), s	19.2	23.1		18.8		15.5		
Green Ext Time (p_c), s	0.7	0.1		0.1		0.3		

Intersection Summary	
HCM 2010 Ctrl Delay	22.8
HCM 2010 LOS	C



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	46	199	262	33	405	386
Future Volume (veh/h)	46	199	262	33	405	386
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		0.98	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1827	1827	1827	1827
Adj Flow Rate, veh/h	51	14	291	20	450	429
Adj No. of Lanes	2	2	2	1	2	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	4	4	4	4
Cap, veh/h	195	158	2180	955	1768	2180
Arrive On Green	0.06	0.06	0.63	0.63	0.63	0.63
Sat Flow, veh/h	3375	2733	3563	1521	2025	3563
Grp Volume(v), veh/h	51	14	291	20	450	429
Grp Sat Flow(s),veh/h/ln	1688	1367	1736	1521	1012	1736
Q Serve(g_s), s	0.4	0.1	0.9	0.1	3.0	1.3
Cycle Q Clear(g_c), s	0.4	0.1	0.9	0.1	3.8	1.3
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	195	158	2180	955	1768	2180
V/C Ratio(X)	0.26	0.09	0.13	0.02	0.25	0.20
Avail Cap(c_a), veh/h	2120	1717	2180	955	1768	2180
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.5	11.4	1.9	1.8	2.7	2.0
Incr Delay (d2), s/veh	0.7	0.2	0.1	0.0	0.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.1	0.4	0.1	0.9	0.7
LnGrp Delay(d),s/veh	12.2	11.6	2.1	1.8	3.0	2.2
LnGrp LOS	B	B	A	A	A	A
Approach Vol, veh/h	65		311			879
Approach Delay, s/veh	12.1		2.0			2.6
Approach LOS	B		A			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		20.0				20.0		5.5
Change Period (Y+Rc), s		4.0				4.0		4.0
Max Green Setting (Gmax), s		16.0				16.0		16.0
Max Q Clear Time (g_c+I1), s		2.9				5.8		2.4
Green Ext Time (p_c), s		5.9				5.1		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	3.0
HCM 2010 LOS	A

Notes

User approved ignoring U-Turning movement.

Intersection	
Intersection Delay, s/veh	22.7
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	121	325	14	0	16	100	83	0	4	114	30	0	189	158	109
Future Vol, veh/h	0	121	325	14	0	16	100	83	0	4	114	30	0	189	158	109
Peak Hour Factor	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94
Heavy Vehicles, %	7	4	4	4	7	4	4	4	7	4	4	4	7	4	4	4
Mvmt Flow	0	129	346	15	0	17	106	88	0	4	121	32	0	201	168	116
Number of Lanes	0	1	1	0	0	1	1	0	0	0	1	0	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	2	2
HCM Control Delay	23.8	15.3	15.3	27.2
HCM LOS	C	C	C	D

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	3%	100%	0%	100%	0%	54%	0%
Vol Thru, %	77%	0%	96%	0%	55%	46%	0%
Vol Right, %	20%	0%	4%	0%	45%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	148	121	339	16	183	347	109
LT Vol	4	121	0	16	0	189	0
Through Vol	114	0	325	0	100	158	0
RT Vol	30	0	14	0	83	0	109
Lane Flow Rate	157	129	361	17	195	369	116
Geometry Grp	6	7	7	7	7	7	7
Degree of Util (X)	0.349	0.28	0.731	0.04	0.41	0.777	0.212
Departure Headway (Hd)	7.976	7.838	7.295	8.423	7.578	7.578	6.584
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	449	458	494	424	473	476	544
Service Time	6.054	5.598	5.055	6.195	5.349	5.336	4.342
HCM Lane V/C Ratio	0.35	0.282	0.731	0.04	0.412	0.775	0.213
HCM Control Delay	15.3	13.6	27.5	11.5	15.6	32.2	11.1
HCM Lane LOS	C	B	D	B	C	D	B
HCM 95th-tile Q	1.5	1.1	6	0.1	2	6.9	0.8

Intersection	
Intersection Delay, s/veh	18.4
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	26	75	24	0	163	118	197	0	0	107	178	0	213	185	40
Future Vol, veh/h	0	26	75	24	0	163	118	197	0	0	107	178	0	213	185	40
Peak Hour Factor	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94
Heavy Vehicles, %	7	4	4	4	7	4	4	4	7	4	4	4	7	4	4	4
Mvmt Flow	0	28	80	26	0	173	126	210	0	0	114	189	0	227	197	43
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	13.1	19.5	20.5	17.3
HCM LOS	B	C	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	0%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	100%	38%	0%	76%	0%	37%	0%	82%
Vol Right, %	0%	62%	0%	24%	0%	63%	0%	18%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	285	26	99	163	315	213	225
LT Vol	0	0	26	0	163	0	213	0
Through Vol	0	107	0	75	0	118	0	185
RT Vol	0	178	0	24	0	197	0	40
Lane Flow Rate	0	303	28	105	173	335	227	239
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0	0.606	0.067	0.236	0.381	0.647	0.495	0.481
Departure Headway (Hd)	7.648	7.199	8.753	8.058	7.919	6.955	7.872	7.233
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	0	500	409	444	454	519	458	498
Service Time	5.402	4.953	6.52	5.825	5.671	4.706	5.625	4.986
HCM Lane V/C Ratio	0	0.606	0.068	0.236	0.381	0.645	0.496	0.48
HCM Control Delay	10.4	20.5	12.2	13.3	15.5	21.6	18.1	16.6
HCM Lane LOS	N	C	B	B	C	C	C	C
HCM 95th-tile Q	0	4	0.2	0.9	1.8	4.6	2.7	2.6

Intersection	
Intersection Delay, s/veh	9.7
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	5	132	1	0	58	161	55	0	0	51	33	0	3	83	4
Future Vol, veh/h	0	5	132	1	0	58	161	55	0	0	51	33	0	3	83	4
Peak Hour Factor	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94
Heavy Vehicles, %	7	4	4	4	7	4	4	4	7	4	4	4	7	4	4	4
Mvmt Flow	0	5	140	1	0	62	171	59	0	0	54	35	0	3	88	4
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	9.6	10	9.2	9.5
HCM LOS	A	A	A	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	0%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	100%	61%	0%	99%	0%	75%	0%	95%
Vol Right, %	0%	39%	0%	1%	0%	25%	0%	5%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	84	5	133	58	216	3	87
LT Vol	0	0	5	0	58	0	3	0
Through Vol	0	51	0	132	0	161	0	83
RT Vol	0	33	0	1	0	55	0	4
Lane Flow Rate	0	89	5	141	62	230	3	93
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0	0.137	0.009	0.211	0.098	0.323	0.006	0.147
Departure Headway (Hd)	5.789	5.512	5.883	5.374	5.735	5.053	6.274	5.737
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	0	646	606	664	623	708	568	621
Service Time	3.559	3.281	3.646	3.137	3.489	2.807	4.044	3.507
HCM Lane V/C Ratio	0	0.138	0.008	0.212	0.1	0.325	0.005	0.15
HCM Control Delay	8.6	9.2	8.7	9.6	9.1	10.2	9.1	9.5
HCM Lane LOS	N	A	A	A	A	B	A	A
HCM 95th-tile Q	0	0.5	0	0.8	0.3	1.4	0	0.5

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	0	62	49	68	90	0	0	0	63	0	0	0
Future Vol, veh/h	0	62	49	68	90	0	0	0	63	0	0	0
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	0	66	52	72	96	0	0	0	67	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	101	0	0	123	0	0	342	342	102	376	368	106
Stage 1	-	-	-	-	-	-	97	97	-	245	245	-
Stage 2	-	-	-	-	-	-	245	245	-	131	123	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.14	6.54	6.24	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-
Follow-up Hdwy	2.236	-	-	2.236	-	-	3.536	4.036	3.336	3.536	4.036	3.336
Pot Cap-1 Maneuver	1479	-	-	1452	-	-	608	577	948	578	558	943
Stage 1	-	-	-	-	-	-	905	811	-	754	700	-
Stage 2	-	-	-	-	-	-	754	700	-	868	790	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1473	-	-	1446	-	-	579	542	940	511	524	935
Mov Cap-2 Maneuver	-	-	-	-	-	-	579	542	-	511	524	-
Stage 1	-	-	-	-	-	-	901	808	-	751	660	-
Stage 2	-	-	-	-	-	-	711	660	-	803	787	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	3.3	9.1	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	940	1473	-	-	1446	-	-	-
HCM Lane V/C Ratio	0.071	-	-	-	0.05	-	-	-
HCM Control Delay (s)	9.1	0	-	-	7.6	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	251

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	268	146	52	60	219	151	29	5	19	224	5	230
Future Vol, veh/h	268	146	52	60	219	151	29	5	19	224	5	230
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	285	155	55	64	233	161	31	5	20	238	5	245

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	399	0	0	216	0	0	1329	1284	193	1217	1232	323
Stage 1	-	-	-	-	-	-	758	758	-	446	446	-
Stage 2	-	-	-	-	-	-	571	526	-	771	786	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.14	6.54	6.24	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-
Follow-up Hdwy	2.236	-	-	2.236	-	-	3.536	4.036	3.336	3.536	4.036	3.336
Pot Cap-1 Maneuver	1149	-	-	1342	-	-	131	163	843	~ 156	176	713
Stage 1	-	-	-	-	-	-	396	412	-	588	571	-
Stage 2	-	-	-	-	-	-	502	526	-	390	400	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1144	-	-	1336	-	-	62	110	836	~ 110	119	707
Mov Cap-2 Maneuver	-	-	-	-	-	-	62	110	-	~ 110	119	-
Stage 1	-	-	-	-	-	-	282	294	-	419	541	-
Stage 2	-	-	-	-	-	-	308	499	-	266	285	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.3	1.1	81.3	$ 754
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	99	1144	-	-	1336	-	-	191
HCM Lane V/C Ratio	0.57	0.249	-	-	0.048	-	-	2.557
HCM Control Delay (s)	81.3	9.2	0	-	7.8	-	-	$ 754
HCM Lane LOS	F	A	A	-	A	-	-	F
HCM 95th %tile Q(veh)	2.6	1	-	-	0.1	-	-	41.6

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	3	164	1	138	267	41	0	0	58	19	0	7
Future Vol, veh/h	3	164	1	138	267	41	0	0	58	19	0	7
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	3	174	1	147	284	44	0	0	62	20	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	333	0	0	181	0	0	794	812	185	821	791	316
Stage 1	-	-	-	-	-	-	186	186	-	604	604	-
Stage 2	-	-	-	-	-	-	608	626	-	217	187	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.14	6.54	6.24	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-
Follow-up Hdwy	2.236	-	-	2.236	-	-	3.536	4.036	3.336	3.536	4.036	3.336
Pot Cap-1 Maneuver	1215	-	-	1382	-	-	304	311	852	291	320	720
Stage 1	-	-	-	-	-	-	811	742	-	482	485	-
Stage 2	-	-	-	-	-	-	479	474	-	781	741	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1210	-	-	1376	-	-	273	275	845	245	283	714
Mov Cap-2 Maneuver	-	-	-	-	-	-	273	275	-	245	283	-
Stage 1	-	-	-	-	-	-	805	737	-	479	431	-
Stage 2	-	-	-	-	-	-	422	422	-	719	736	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	2.5	9.6	18.3
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	845	1210	-	-	1376	-	-	298
HCM Lane V/C Ratio	0.073	0.003	-	-	0.107	-	-	0.093
HCM Control Delay (s)	9.6	8	0	-	7.9	-	-	18.3
HCM Lane LOS	A	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0.2	0	-	-	0.4	-	-	0.3

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	62	24	24	223	336	36
Future Vol, veh/h	62	24	24	223	336	36
Conflicting Peds, #/hr	5	5	5	0	0	5
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	66	26	26	237	357	38

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	670	387	401	0	-	0
Stage 1	382	-	-	-	-	-
Stage 2	288	-	-	-	-	-
Critical Hdwy	6.44	6.24	4.14	-	-	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.336	2.236	-	-	-
Pot Cap-1 Maneuver	419	657	1147	-	-	-
Stage 1	686	-	-	-	-	-
Stage 2	756	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	405	652	1142	-	-	-
Mov Cap-2 Maneuver	405	-	-	-	-	-
Stage 1	683	-	-	-	-	-
Stage 2	733	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.9	0.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1142	-	453	-	-
HCM Lane V/C Ratio	0.022	-	0.202	-	-
HCM Control Delay (s)	8.2	0	14.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.7	-	-

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	54	0	0	0	0	0	0	0	0	0	0
Future Vol, veh/h	0	54	0	0	0	0	0	0	0	0	0	0
Peak Hour Factor	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94
Heavy Vehicles, %	7	4	4	4	7	4	4	4	7	4	4	4
Mvmt Flow	0	57	0	0	0	0	0	0	0	0	0	0
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	8.5	0	0
HCM LOS	A	-	-

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	0%	0%	100%	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	0%	100%	100%	100%	100%	0%
Vol Right, %	0%	0%	0%	0%	0%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	54	0	0	0	0	112
LT Vol	0	0	54	0	0	0	0	0
Through Vol	0	0	0	0	0	0	0	0
RT Vol	0	0	0	0	0	0	0	112
Lane Flow Rate	0	0	57	0	0	0	0	119
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0	0	0.084	0	0	0	0	0.131
Departure Headway (Hd)	4.73	4.73	5.279	4.778	4.81	4.81	4.669	3.968
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	0	0	677	0	0	0	0	895
Service Time	2.513	2.513	3.028	2.527	2.581	2.581	2.434	1.733
HCM Lane V/C Ratio	0	0	0.084	0	0	0	0	0.133
HCM Control Delay	7.5	7.5	8.5	7.5	7.6	7.6	7.4	7.3
HCM Lane LOS	N	N	A	N	N	N	N	A
HCM 95th-tile Q	0	0	0.3	0	0	0	0	0.5

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	0	0	112
Future Vol, veh/h	0	0	0	112
Peak Hour Factor	0.88	0.94	0.94	0.94
Heavy Vehicles, %	7	4	4	4
Mvmt Flow	0	0	0	119
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	7.3
HCM LOS	A

Lane

APPENDIX 3.13-4:
TECHNICAL CALCULATIONS –
EXISTING PLUS PROJECT CONDITIONS
FREEWAY LOS

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	9/21/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	Eastbound SR 120
From/To:	Yosemite ON to Airport OFF
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	2278	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	633	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1341	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1341	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	20.6	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	Eastbound SR 120
Junction:	Airport Way Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2278	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	355	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	86	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	7160	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	2278		355		86		vph
Peak-hour factor, PHF	0.90		0.90		0.90		
Peak 15-min volume, v15	633		99		24		v
Trucks and buses	12		7		11		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.943	0.966	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2683	408	101	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2683 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2683	4700	No
$v_{FO} = v_F - v_R$	2275	4700	No
v_R	408	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2683 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2683	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\ v_R - 0.009\ L_D$ = 25.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.335	
Space mean speed in ramp influence area,	S_R = 57.3	mph
Space mean speed in outer lanes,	S_O = N/A	mph
Space mean speed for all vehicles,	S = 57.3	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Airport Way On-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1923	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	474	vph
Length of first accel/decel lane	415	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	263	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2060	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1923	474	263	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	534	132	73	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2265	545	302	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2265 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2810	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2265 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2810	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A =$ 24.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.348	
Space mean speed in ramp influence area,	S_R = 57.0	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.0	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	9/21/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	SR 120 Eastbound
From/To:	Airport ON to Union OFF
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	2397	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	666	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1412	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1412	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.7	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Union Rd Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2397	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	263	vph
Length of first accel/decel lane	245	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	322	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2060	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	2397		263		322		vph
Peak-hour factor, PHF	0.90		0.90		0.90		
Peak 15-min volume, v15	666		73		89		v
Trucks and buses	12		7		7		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2823	302	370	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2823 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2823	4700	No
$v_{FO} = v_F - v_R$	2521	4700	No
v_R	302	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2823 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2823	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 26.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.325	
Space mean speed in ramp influence area,	S_R = 57.5	mph
Space mean speed in outer lanes,	S_O = N/A	mph
Space mean speed for all vehicles,	S = 57.5	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Union Rd On-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2134	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	286	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	409	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2134	286	409	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	593	79	114	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2513	329	470	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2513 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2842	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2513 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2842	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 24.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.338	
Space mean speed in ramp influence area,	S_R = 57.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.2	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	9/21/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	Eastbound SR 120
From/To:	Yosemite ON to Airport OFF
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	4492	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1248	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2645	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2645	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	43.0	mi/h
Number of lanes, N	2	
Density, D	61.5	pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	Eastbound SR 120
Junction:	Airport Way Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4492	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1111	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	150	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	7160	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	4492		1111		150		vph
Peak-hour factor, PHF	0.90		0.90		0.90		
Peak 15-min volume, v15	1248		309		42		v
Trucks and buses	12		4		9		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.943	0.980	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5291	1259	174	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 5291 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5291	4700	Yes
$v_{FO} = v_F - v_R$	4032	4700	No
v_R	1259	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34} > 2700 pc/h?		No	
Is v_3 or v_{av34} > 1.5 v_{12} /2		No	

If yes, v_{12A} = 5291 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5291	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 47.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	D_S = 0.411	
Space mean speed in ramp influence area,	S_R = 55.5	mph
Space mean speed in outer lanes,	S_O = N/A	mph
Space mean speed for all vehicles,	S = 55.5	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Airport Way On-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3381	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	587	vph
Length of first accel/decel lane	415	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	666	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2060	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3381	587	666	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	939	163	185	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3982	665	755	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3982 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4647	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3982 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4647	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 38.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.690	
Space mean speed in ramp influence area,	S_R = 49.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 49.1	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	9/21/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR 120 Eastbound
From/To:	Airport ON to Union OFF
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	3968	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1102	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2337	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2337	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	52.6	mi/h
Number of lanes, N	2	
Density, D	44.5	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Union Rd Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3968	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	666	vph
Length of first accel/decel lane	245	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	446	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2060	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	3968		666		446		vph
Peak-hour factor, PHF	0.90		0.90		0.90		
Peak 15-min volume, v15	1102		185		124		v
Trucks and buses	12		4		4		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4673	755	505	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4673 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4673	4700	No
$v_{FO} = v_F - v_R$	3918	4700	No
v_R	755	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 4673 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4673	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 42.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.366

Space mean speed in ramp influence area, S_R = 56.6 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 56.6 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Union Rd On-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3302	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	250	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	727	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3302	250	727	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	917	69	202	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3889	283	824	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3889 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4172	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3889 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4172	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 34.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.524	
Space mean speed in ramp influence area,	S_R = 52.9	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.9	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Union Rd Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3286	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	351	vph
Length of first accel/decel lane	180	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	632	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2110	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	3286		351		632		vph
Peak-hour factor, PHF	0.90		0.90		0.90		
Peak 15-min volume, v15	913		98		176		v
Trucks and buses	12		7		7		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3870	404	727	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3870 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3870	4700	No
$v_{FO} = v_F - v_R$	3466	4700	No
v_R	404	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3870 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3870	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 35.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	D_S = 0.334	
Space mean speed in ramp influence area,	S_R = 57.3	mph
Space mean speed in outer lanes,	S_O = N/A	mph
Space mean speed for all vehicles,	S = 57.3	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Union Rd On-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2935	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	395	vph
Length of first accel/decel lane	480	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	328	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2120	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2935	395	328	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	815	110	91	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3457	454	377	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3457 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3911	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3457 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3911	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 32.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.473	
Space mean speed in ramp influence area,	S_R = 54.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.1	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	9/21/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	SR 120 Westbound
From/To:	Union ON to Airport OFF
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	3330	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	925	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1961	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1961	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	60.5	mi/h
Number of lanes, N	2	
Density, D	32.4	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Airport Way Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3330	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	396	vph
Length of first accel/decel lane	185	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	395	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2120	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	3330		396		395		vph
Peak-hour factor, PHF	0.90		0.90		0.90		
Peak 15-min volume, v15	925		110		110		v
Trucks and buses	12		7		7		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3922	455	454	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3922 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3922	4700	No
$v_{FO} = v_F - v_R$	3467	4700	No
v_R	455	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3922 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3922	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\ v_R - 0.009\ L_D$ = 36.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	D_S = 0.339	
Space mean speed in ramp influence area,	S_R = 57.2	mph
Space mean speed in outer lanes,	S_O = N/A	mph
Space mean speed for all vehicles,	S = 57.2	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	Westbound SR 120
Junction:	Airport Way On-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2934	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	849	vph
Length of first accel/decel lane	512	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	104	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2934	849	104	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	815	236	29	v
Trucks and buses	12	7	11	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3456	976	122	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3456 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4432	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3456 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4432	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 36.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.603	
Space mean speed in ramp influence area,	S_R = 51.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.1	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	9/21/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	Westbound SR 120
From/To:	Airport ON to Yosemite OFF
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	3783	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1051	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2228	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2228	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	55.3	mi/h
Number of lanes, N	2	
Density, D	40.3	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Union Rd Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3055	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	398	vph
Length of first accel/decel lane	180	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	591	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2110	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	3055		398		591		vph
Peak-hour factor, PHF	0.90		0.90		0.90		
Peak 15-min volume, v15	849		111		164		v
Trucks and buses	12		4		4		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3598	451	670	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3598 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3598	4700	No
$v_{FO} = v_F - v_R$	3147	4700	No
v_R	451	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3598 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3598	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 33.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	D_S = 0.339	
Space mean speed in ramp influence area,	S_R = 57.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.2	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Union Rd On-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2657	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	322	vph
Length of first accel/decel lane	480	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	530	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2120	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2657	322	530	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	738	89	147	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3129	365	601	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 3129 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3494	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3129 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3494	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A =$ 29.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.406	
Space mean speed in ramp influence area,	S_R = 55.7	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 55.7	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	9/21/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR 120 Westbound
From/To:	Union ON to Airport OFF
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	2979	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	828	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1754	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1754	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.2	mi/h
Number of lanes, N	2	
Density, D	27.7	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Airport Way Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2979	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	732	vph
Length of first accel/decel lane	185	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	322	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2120	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	2979		732		322		vph
Peak-hour factor, PHF	0.90		0.90		0.90		
Peak 15-min volume, v15	828		203		89		v
Trucks and buses	12		4		4		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3509	830	365	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3509 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3509	4700	No
$v_{FO} = v_F - v_R$	2679	4700	No
v_R	830	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3509 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3509	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 32.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.373

Space mean speed in ramp influence area, S_R = 56.4 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 56.4 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	9/21/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	Westbound SR 120
Junction:	Airport Way On-Ramp
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2247	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	591	vph
Length of first accel/decel lane	512	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	97	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2247	591	97	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	624	164	27	v
Trucks and buses	12	4	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2646	670	113	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2646 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3316	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2646 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3316	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 27.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.382	
Space mean speed in ramp influence area,	S_R = 56.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 56.2	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	9/21/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	Westbound SR 120
From/To:	Airport ON to Yosemite OFF
Jurisdiction:	District 10
Analysis Year:	Existing Plus Project
Description:	Oakwood Landing

Flow Inputs and Adjustments

Volume, V	2838	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	788	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1671	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1671	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.0	mi/h
Number of lanes, N	2	
Density, D	26.1	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

APPENDIX 3.13-5:
TECHNICAL CALCULATIONS –
CUMULATIVE NO PROJECT CONDITIONS
INTERSECTION LOS

Intersection	
Intersection Delay, s/veh	26.6
Intersection LOS	D

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	50	160	30	0	100	200	190	0	70	120	160
Future Vol, veh/h	0	50	160	30	0	100	200	190	0	70	120	160
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	0	54	174	33	0	109	217	207	0	76	130	174
Number of Lanes	0	1	1	0	0	1	1	1	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	3	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	3
HCM Control Delay	20.8	17.1	41.8
HCM LOS	C	C	E

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1
Vol Left, %	20%	100%	0%	100%	0%	0%	44%
Vol Thru, %	34%	0%	84%	0%	100%	0%	41%
Vol Right, %	46%	0%	16%	0%	0%	100%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	350	50	190	100	200	190	270
LT Vol	70	50	0	100	0	0	120
Through Vol	120	0	160	0	200	0	110
RT Vol	160	0	30	0	0	190	40
Lane Flow Rate	380	54	207	109	217	207	293
Geometry Grp	7	8	8	7	7	7	7
Degree of Util (X)	0.848	0.151	0.536	0.267	0.502	0.435	0.701
Departure Headway (Hd)	8.028	9.988	9.344	8.837	8.318	7.59	8.602
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	453	359	386	407	433	473	420
Service Time	5.781	7.758	7.114	6.597	6.077	5.349	6.36
HCM Lane V/C Ratio	0.839	0.15	0.536	0.268	0.501	0.438	0.698
HCM Control Delay	41.8	14.5	22.5	14.8	19.2	16.1	29.3
HCM Lane LOS	E	B	C	B	C	C	D
HCM 95th-tile Q	8.4	0.5	3	1.1	2.7	2.2	5.3

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	120	110	40
Future Vol, veh/h	0	120	110	40
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	7	7	7	7
Mvmt Flow	0	130	120	43
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	3
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	29.3
HCM LOS	D

Lane

Intersection	
Intersection Delay, s/veh	34.9
Intersection LOS	D

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	50	120	0	0	40	70	400	0	0	290	140	0	30	60	20
Future Vol, veh/h	0	50	120	0	0	40	70	400	0	0	290	140	0	30	60	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	7	0	2	7	7	7	5	0	7	7	7	7	7	0	7	5
Mvmt Flow	0	54	130	0	0	43	76	435	0	0	315	152	0	33	65	22
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	14.7	46	35.2	13.2
HCM LOS	B	E	E	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	29%	8%	27%
Vol Thru, %	67%	71%	14%	55%
Vol Right, %	33%	0%	78%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	430	170	510	110
LT Vol	0	50	40	30
Through Vol	290	120	70	60
RT Vol	140	0	400	20
Lane Flow Rate	467	185	554	120
Geometry Grp	1	1	1	1
Degree of Util (X)	0.841	0.377	0.928	0.253
Departure Headway (Hd)	6.578	7.351	6.029	7.609
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	556	492	599	475
Service Time	4.578	5.363	4.124	5.621
HCM Lane V/C Ratio	0.84	0.376	0.925	0.253
HCM Control Delay	35.2	14.7	46	13.2
HCM Lane LOS	E	B	E	B
HCM 95th-tile Q	8.8	1.7	11.9	1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	120	240	30	80	260	210	220	500	220	320	390	240
Future Volume (veh/h)	120	240	30	80	260	210	220	500	220	320	390	240
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1712	1877	1900	1827	1857	1900	1845	1827	1863	1827	1792	1845
Adj Flow Rate, veh/h	130	261	24	87	283	87	239	543	148	348	424	83
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	11	0	0	4	1	1	3	4	2	4	6	3
Cap, veh/h	175	673	61	138	468	141	295	605	515	399	704	606
Arrive On Green	0.11	0.20	0.19	0.08	0.18	0.16	0.17	0.33	0.33	0.23	0.39	0.39
Sat Flow, veh/h	1630	3294	300	1740	2653	797	1757	1827	1554	1740	1792	1545
Grp Volume(v), veh/h	130	140	145	87	186	184	239	543	148	348	424	83
Grp Sat Flow(s),veh/h/ln	1630	1783	1811	1740	1764	1686	1757	1827	1554	1740	1792	1545
Q Serve(g_s), s	7.9	7.0	7.1	5.0	9.9	10.4	13.4	29.0	7.2	19.8	19.3	3.5
Cycle Q Clear(g_c), s	7.9	7.0	7.1	5.0	9.9	10.4	13.4	29.0	7.2	19.8	19.3	3.5
Prop In Lane	1.00		0.17	1.00		0.47	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	175	364	370	138	311	298	295	605	515	399	704	606
V/C Ratio(X)	0.74	0.38	0.39	0.63	0.60	0.62	0.81	0.90	0.29	0.87	0.60	0.14
Avail Cap(c_a), veh/h	175	469	477	215	493	472	480	664	565	458	704	606
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.4	35.2	35.4	45.8	38.9	39.4	41.1	32.6	25.4	38.1	24.8	20.0
Incr Delay (d2), s/veh	15.7	0.7	0.7	4.7	1.8	2.1	5.3	14.2	0.3	15.3	1.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	3.5	3.6	2.6	5.0	5.0	6.9	17.0	3.2	11.2	9.8	1.5
LnGrp Delay(d),s/veh	60.1	35.9	36.1	50.4	40.7	41.5	46.4	46.8	25.7	53.4	26.2	20.1
LnGrp LOS	E	D	D	D	D	D	D	D	C	D	C	C
Approach Vol, veh/h		415			457			930			855	
Approach Delay, s/veh		43.6			42.9			43.3			36.7	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.5	38.0	12.1	25.0	21.2	44.3	15.0	22.1
Change Period (Y+Rc), s	5.3	5.3	5.7	5.7	5.3	5.3	5.7	5.7
Max Green Setting (Gmax), s	25.7	36.0	11.0	25.3	26.7	35.0	9.3	27.0
Max Q Clear Time (g_c+I1), s	21.8	31.0	7.0	9.1	15.4	21.3	9.9	12.4
Green Ext Time (p_c), s	0.4	1.7	0.1	3.2	0.5	5.8	0.0	3.0

Intersection Summary	
HCM 2010 Ctrl Delay	41.2
HCM 2010 LOS	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	30	300	310	40	60	560	850	310	80	470	60
Future Volume (veh/h)	110	30	300	310	40	60	560	850	310	80	470	60
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776
Adj Flow Rate, veh/h	120	33	17	337	43	10	609	924	127	87	511	13
Adj No. of Lanes	2	1	1	2	1	1	2	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	196	143	117	444	278	229	757	1582	690	110	1023	450
Arrive On Green	0.06	0.08	0.08	0.14	0.16	0.16	0.23	0.47	0.47	0.06	0.30	0.30
Sat Flow, veh/h	3281	1776	1442	3281	1776	1466	3281	3374	1471	1691	3374	1484
Grp Volume(v), veh/h	120	33	17	337	43	10	609	924	127	87	511	13
Grp Sat Flow(s),veh/h/ln	1640	1776	1442	1640	1776	1466	1640	1687	1471	1691	1687	1484
Q Serve(g_s), s	2.3	1.1	0.7	6.3	1.3	0.4	11.2	12.8	3.2	3.2	8.0	0.4
Cycle Q Clear(g_c), s	2.3	1.1	0.7	6.3	1.3	0.4	11.2	12.8	3.2	3.2	8.0	0.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	196	143	117	444	278	229	757	1582	690	110	1023	450
V/C Ratio(X)	0.61	0.23	0.15	0.76	0.15	0.04	0.80	0.58	0.18	0.79	0.50	0.03
Avail Cap(c_a), veh/h	308	444	361	564	583	481	1077	1582	690	185	1023	450
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.3	27.5	27.3	26.7	23.3	22.9	23.2	12.4	9.9	29.5	18.3	15.7
Incr Delay (d2), s/veh	3.1	0.8	0.6	4.5	0.3	0.1	3.0	1.6	0.6	12.1	1.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.6	0.3	3.1	0.7	0.2	5.4	6.3	1.4	1.9	3.9	0.2
LnGrp Delay(d),s/veh	32.4	28.3	27.9	31.2	23.6	23.0	26.3	14.0	10.5	41.5	20.0	15.8
LnGrp LOS	C	C	C	C	C	C	C	B	B	D	C	B
Approach Vol, veh/h		170			390			1660			611	
Approach Delay, s/veh		31.2			30.1			18.2			23.0	
Approach LOS		C			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.1	34.0	12.6	9.2	18.8	23.4	7.8	14.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	7.0	30.0	11.0	16.0	21.0	16.0	6.0	21.0
Max Q Clear Time (g_c+I1), s	5.2	14.8	8.3	3.1	13.2	10.0	4.3	3.3
Green Ext Time (p_c), s	0.0	9.1	0.3	0.3	1.5	4.4	0.0	0.4

Intersection Summary	
HCM 2010 Ctrl Delay	21.7
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	240	0	780	220	940	0	0	640	440
Future Volume (veh/h)	0	0	0	240	0	780	220	940	0	0	640	440
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1776	1776	1776	1776	0	0	1776	1776
Adj Flow Rate, veh/h				261	0	800	239	1022	0	0	696	266
Adj No. of Lanes				0	1	1	1	1	0	0	1	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				7	7	7	7	7	0	0	7	7
Cap, veh/h				725	0	647	221	913	0	0	647	538
Arrive On Green				0.43	0.00	0.43	0.13	0.51	0.00	0.00	0.36	0.36
Sat Flow, veh/h				1691	0	1509	1691	1776	0	0	1776	1476
Grp Volume(v), veh/h				261	0	800	239	1022	0	0	696	266
Grp Sat Flow(s),veh/h/ln				1691	0	1509	1691	1776	0	0	1776	1476
Q Serve(g_s), s				14.6	0.0	60.0	18.3	72.0	0.0	0.0	51.0	19.6
Cycle Q Clear(g_c), s				14.6	0.0	60.0	18.3	72.0	0.0	0.0	51.0	19.6
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				725	0	647	221	913	0	0	647	538
V/C Ratio(X)				0.36	0.00	1.24	1.08	1.12	0.00	0.00	1.08	0.49
Avail Cap(c_a), veh/h				725	0	647	221	913	0	0	647	538
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				27.0	0.0	40.0	60.8	34.0	0.0	0.0	44.5	34.5
Incr Delay (d2), s/veh				0.4	0.0	119.5	83.8	68.2	0.0	0.0	57.6	0.9
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				6.9	0.0	46.4	13.7	52.3	0.0	0.0	35.3	8.1
LnGrp Delay(d),s/veh				27.4	0.0	159.5	144.7	102.2	0.0	0.0	102.1	35.4
LnGrp LOS				C		F	F	F			F	D
Approach Vol, veh/h					1061			1261			962	
Approach Delay, s/veh					127.0			110.2			83.6	
Approach LOS					F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		76.0			21.0	55.0		64.0
Change Period (Y+Rc), s		5.3			4.0	5.3		4.6
Max Green Setting (Gmax), s		70.7			17.0	49.7		59.4
Max Q Clear Time (g_c+I1), s		74.0			20.3	53.0		62.0
Green Ext Time (p_c), s		0.0			0.0	0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	107.9
HCM 2010 LOS	F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	370	0	240	0	0	0	0	790	540	270	610	0
Future Volume (veh/h)	370	0	240	0	0	0	0	790	540	270	610	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1776	1776				0	1776	1776	1776	1776	0
Adj Flow Rate, veh/h	402	0	45				0	859	408	293	663	0
Adj No. of Lanes	0	1	1				0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7				0	7	7	7	7	0
Cap, veh/h	400	0	357				0	856	712	292	1227	0
Arrive On Green	0.24	0.00	0.24				0.00	0.48	0.48	0.17	0.69	0.00
Sat Flow, veh/h	1691	0	1509				0	1776	1477	1691	1776	0
Grp Volume(v), veh/h	402	0	45				0	859	408	293	663	0
Grp Sat Flow(s),veh/h/ln	1691	0	1509				0	1776	1477	1691	1776	0
Q Serve(g_s), s	26.0	0.0	2.6				0.0	53.0	21.8	19.0	20.3	0.0
Cycle Q Clear(g_c), s	26.0	0.0	2.6				0.0	53.0	21.8	19.0	20.3	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	400	0	357				0	856	712	292	1227	0
V/C Ratio(X)	1.01	0.00	0.13				0.00	1.00	0.57	1.00	0.54	0.00
Avail Cap(c_a), veh/h	400	0	357				0	856	712	292	1227	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	42.0	0.0	33.1				0.0	28.5	20.4	45.5	8.4	0.0
Incr Delay (d2), s/veh	46.4	0.0	0.2				0.0	31.7	1.1	53.4	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.3	0.0	1.1				0.0	33.4	9.0	13.2	9.9	0.0
LnGrp Delay(d),s/veh	88.5	0.0	33.3				0.0	60.3	21.5	98.9	8.8	0.0
LnGrp LOS	F		C					F	C	F	A	
Approach Vol, veh/h		447						1267			956	
Approach Delay, s/veh		82.9						47.8			36.4	
Approach LOS		F						D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	23.0	57.0		30.0		80.0		
Change Period (Y+Rc), s	4.0	5.3		4.6		5.3		
Max Green Setting (Gmax), s	19.0	51.7		25.4		74.7		
Max Q Clear Time (g_c+I1), s	21.0	55.0		28.0		22.3		
Green Ext Time (p_c), s	0.0	0.0		0.0		11.5		

Intersection Summary	
HCM 2010 Ctrl Delay	49.6
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	24.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	260	10	20	20	30	400	0	670	30	360	340	150
Future Vol, veh/h	260	10	20	20	30	400	0	670	30	360	340	150
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	340	-	0	0	-	0	175	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	283	11	22	22	33	435	0	728	33	391	370	163

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1897	1880	372	1886	1880	730	370	0	0	728	0	0
Stage 1	1152	1152	-	728	728	-	-	-	-	-	-	-
Stage 2	745	728	-	1158	1152	-	-	-	-	-	-	-
Critical Hdwy	7.17	6.57	6.27	7.17	6.57	6.27	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.17	5.57	-	6.17	5.57	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.17	5.57	-	6.17	5.57	-	-	-	-	-	-	-
Follow-up Hdwy	3.563	4.063	3.363	3.563	4.063	3.363	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 51	69	663	52	69	~ 414	1161	-	-	853	-	-
Stage 1	~ 235	266	-	407	421	-	-	-	-	-	-	-
Stage 2	398	421	-	233	266	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	37	662	25	37	~ 413	1159	-	-	852	-	-
Mov Cap-2 Maneuver	-	37	-	25	37	-	-	-	-	-	-	-
Stage 1	~ 235	144	-	407	421	-	-	-	-	-	-	-
Stage 2	-	421	-	113	144	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s		115	0	5.4
HCM LOS	-	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBL	SBT	SBR
Capacity (veh/h)	1159	-	-	-	662	25	37	413	852	-	-
HCM Lane V/C Ratio	-	-	-	-	0.033	0.87	0.881	1.053	0.459	-	-
HCM Control Delay (s)	0	-	-	-	10.6	$ 358.8	273.8	90.9	12.8	-	-
HCM Lane LOS	A	-	-	-	B	F	F	F	B	-	-
HCM 95th %tile Q(veh)	0	-	-	-	0.1	2.7	3.2	14.2	2.4	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Intersection Delay, s/veh	22.9
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	220	30	70	0	10	60	200	0	70	200	20
Future Vol, veh/h	0	220	30	70	0	10	60	200	0	70	200	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	7	0	5	4	7	0	0	0	7	7	12	0
Mvmt Flow	0	239	33	76	0	11	65	217	0	76	217	22
Number of Lanes	0	0	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	25.9	19	23
HCM LOS	D	C	C

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	24%	69%	100%	0%	13%
Vol Thru, %	69%	9%	0%	23%	65%
Vol Right, %	7%	22%	0%	77%	23%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	290	320	10	260	310
LT Vol	70	220	10	0	40
Through Vol	200	30	0	60	200
RT Vol	20	70	0	200	70
Lane Flow Rate	315	348	11	283	337
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.645	0.703	0.025	0.57	0.664
Departure Headway (Hd)	7.371	7.278	8.331	7.26	7.096
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	489	494	428	495	509
Service Time	5.447	5.351	6.104	5.032	5.17
HCM Lane V/C Ratio	0.644	0.704	0.026	0.572	0.662
HCM Control Delay	23	25.9	11.3	19.3	23.2
HCM Lane LOS	C	D	B	C	C
HCM 95th-tile Q	4.5	5.5	0.1	3.5	4.8

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	40	200	70
Future Vol, veh/h	0	40	200	70
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	7	0	4	5
Mvmt Flow	0	43	217	76
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	23.2
HCM LOS	C

Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	270	0	450	590	700	0	0	700	550
Future Volume (veh/h)	0	0	0	270	0	450	590	700	0	0	700	550
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1776	1776	1776	1776	0	0	1776	1776
Adj Flow Rate, veh/h				293	0	210	641	761	0	0	761	357
Adj No. of Lanes				0	1	1	1	1	0	0	1	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				7	7	7	7	7	0	0	7	7
Cap, veh/h				278	0	248	580	1383	0	0	723	600
Arrive On Green				0.16	0.00	0.16	0.34	0.78	0.00	0.00	0.41	0.41
Sat Flow, veh/h				1691	0	1509	1691	1776	0	0	1776	1474
Grp Volume(v), veh/h				293	0	210	641	761	0	0	761	357
Grp Sat Flow(s),veh/h/ln				1691	0	1509	1691	1776	0	0	1776	1474
Q Serve(g_s), s				23.0	0.0	18.9	48.0	23.2	0.0	0.0	57.0	26.5
Cycle Q Clear(g_c), s				23.0	0.0	18.9	48.0	23.2	0.0	0.0	57.0	26.5
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				278	0	248	580	1383	0	0	723	600
V/C Ratio(X)				1.05	0.00	0.85	1.11	0.55	0.00	0.00	1.05	0.60
Avail Cap(c_a), veh/h				278	0	248	580	1383	0	0	723	600
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				58.5	0.0	56.8	46.0	6.0	0.0	0.0	41.5	32.5
Incr Delay (d2), s/veh				69.1	0.0	21.9	69.7	0.3	0.0	0.0	48.2	1.1
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				16.1	0.0	9.4	33.6	11.3	0.0	0.0	37.6	11.0
LnGrp Delay(d),s/veh				127.6	0.0	78.7	115.7	6.3	0.0	0.0	89.7	33.6
LnGrp LOS				F		E	F	A			F	C
Approach Vol, veh/h					503			1402			1118	
Approach Delay, s/veh					107.2			56.3			71.8	
Approach LOS					F			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		113.0			52.0	61.0		27.0
Change Period (Y+Rc), s		4.9			4.0	4.9		4.9
Max Green Setting (Gmax), s		108.1			48.0	56.1		22.1
Max Q Clear Time (g_c+I1), s		25.2			50.0	59.0		25.0
Green Ext Time (p_c), s		0.4			0.0	0.0		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		70.5
HCM 2010 LOS		E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	0	360	0	0	0	0	1070	320	290	680	0
Future Volume (veh/h)	220	0	360	0	0	0	0	1070	320	290	680	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1776	1776				0	1776	1900	1776	1776	0
Adj Flow Rate, veh/h	239	0	55				0	1163	340	315	739	0
Adj No. of Lanes	0	1	1				0	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7				0	7	7	7	7	0
Cap, veh/h	190	0	170				0	878	257	243	1487	0
Arrive On Green	0.11	0.00	0.11				0.00	0.67	0.66	0.14	0.84	0.00
Sat Flow, veh/h	1691	0	1509				0	1314	384	1691	1776	0
Grp Volume(v), veh/h	239	0	55				0	0	1503	315	739	0
Grp Sat Flow(s),veh/h/ln	1691	0	1509				0	0	1698	1691	1776	0
Q Serve(g_s), s	18.0	0.0	5.4				0.0	0.0	107.0	23.0	18.5	0.0
Cycle Q Clear(g_c), s	18.0	0.0	5.4				0.0	0.0	107.0	23.0	18.5	0.0
Prop In Lane	1.00		1.00				0.00		0.23	1.00		0.00
Lane Grp Cap(c), veh/h	190	0	170				0	0	1135	243	1487	0
V/C Ratio(X)	1.26	0.00	0.32				0.00	0.00	1.32	1.30	0.50	0.00
Avail Cap(c_a), veh/h	190	0	170				0	0	1135	243	1487	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	71.5	0.0	65.4				0.0	0.0	26.6	68.5	3.6	0.0
Incr Delay (d2), s/veh	150.8	0.0	0.4				0.0	0.0	152.0	160.1	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.4	0.0	2.3				0.0	0.0	97.4	21.5	8.9	0.0
LnGrp Delay(d),s/veh	222.2	0.0	65.8				0.0	0.0	178.6	228.6	3.7	0.0
LnGrp LOS	F		E						F	F	A	
Approach Vol, veh/h		294						1503			1054	
Approach Delay, s/veh		193.0						178.6			70.9	
Approach LOS		F						F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	27.0	111.0		22.0		138.0		
Change Period (Y+Rc), s	4.0	4.9		4.9		4.9		
Max Green Setting (Gmax), s	23.0	106.1		17.1		133.1		
Max Q Clear Time (g_c+I1), s	25.0	109.0		20.0		20.5		
Green Ext Time (p_c), s	0.0	0.0		0.0		0.5		

Intersection Summary	
HCM 2010 Ctrl Delay	140.2
HCM 2010 LOS	F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	280	20	10	10	30	200	30	880	20	230	360	340
Future Volume (veh/h)	280	20	10	10	30	200	30	880	20	230	360	340
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1900	1776	1776	1776	1776	1776	1776	1776	1776	1900
Adj Flow Rate, veh/h	304	22	2	11	33	0	33	957	11	250	391	257
Adj No. of Lanes	1	1	0	2	1	2	1	1	1	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	326	321	29	97	66	99	41	996	835	300	1221	791
Arrive On Green	0.19	0.20	0.20	0.03	0.04	0.00	0.02	0.56	0.56	0.09	0.63	0.63
Sat Flow, veh/h	1691	1601	146	3281	1776	2656	1691	1776	1488	3281	1945	1261
Grp Volume(v), veh/h	304	0	24	11	33	0	33	957	11	250	338	310
Grp Sat Flow(s),veh/h/ln	1691	0	1747	1640	1776	1328	1691	1776	1488	1640	1687	1519
Q Serve(g_s), s	24.0	0.0	1.5	0.4	2.5	0.0	2.6	69.6	0.4	10.2	12.7	12.9
Cycle Q Clear(g_c), s	24.0	0.0	1.5	0.4	2.5	0.0	2.6	69.6	0.4	10.2	12.7	12.9
Prop In Lane	1.00		0.08	1.00		1.00	1.00		1.00	1.00		0.83
Lane Grp Cap(c), veh/h	326	0	350	97	66	99	41	996	835	300	1059	953
V/C Ratio(X)	0.93	0.00	0.07	0.11	0.50	0.00	0.80	0.96	0.01	0.83	0.32	0.32
Avail Cap(c_a), veh/h	337	0	350	387	210	314	87	996	835	363	1059	953
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.9	0.0	43.9	64.0	64.0	0.0	65.8	28.4	13.2	60.6	11.7	11.8
Incr Delay (d2), s/veh	31.9	0.0	0.1	0.5	5.7	0.0	28.8	20.6	0.0	13.1	0.8	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.1	0.0	0.7	0.2	1.3	0.0	1.6	39.7	0.2	5.2	6.1	5.7
LnGrp Delay(d),s/veh	85.8	0.0	44.0	64.6	69.7	0.0	94.6	48.9	13.2	73.7	12.5	12.7
LnGrp LOS	F		D	E	E		F	D	B	E	B	B
Approach Vol, veh/h		328			44			1001			898	
Approach Delay, s/veh		82.7			68.4			50.0			29.6	
Approach LOS		F			E			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.4	80.0	8.0	31.2	7.3	89.1	30.1	9.1
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	15.0	76.0	16.0	27.0	7.0	84.0	27.0	16.0
Max Q Clear Time (g_c+I1), s	12.2	71.6	2.4	3.5	4.6	14.9	26.0	4.5
Green Ext Time (p_c), s	0.2	3.5	0.0	0.2	0.0	19.3	0.1	0.1

Intersection Summary	
HCM 2010 Ctrl Delay	47.0
HCM 2010 LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Intersection Delay, s/veh	54.1
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	140	150	10	0	20	140	430	0	30	360	20	0	110	160	70
Future Vol, veh/h	0	140	150	10	0	20	140	430	0	30	360	20	0	110	160	70
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	0	152	163	11	0	22	152	467	0	33	391	22	0	120	174	76
Number of Lanes	0	1	1	0	0	1	1	0	0	0	1	0	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	2	2
HCM Control Delay	19.4	69.9	75.7	31.1
HCM LOS	C	F	F	D

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	7%	100%	0%	100%	0%	41%	0%
Vol Thru, %	88%	0%	94%	0%	25%	59%	0%
Vol Right, %	5%	0%	6%	0%	75%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	410	140	160	20	570	270	70
LT Vol	30	140	0	20	0	110	0
Through Vol	360	0	150	0	140	160	0
RT Vol	20	0	10	0	430	0	70
Lane Flow Rate	446	152	174	22	620	293	76
Geometry Grp	6	7	7	7	7	7	7
Degree of Util (X)	1	0.415	0.448	0.056	1	0.756	0.177
Departure Headway (Hd)	9.005	9.821	9.278	9.287	8.26	9.275	8.373
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	406	367	388	388	446	390	428
Service Time	7.005	7.587	7.044	6.987	5.96	7.038	6.136
HCM Lane V/C Ratio	1.099	0.414	0.448	0.057	1.39	0.751	0.178
HCM Control Delay	75.7	19.4	19.4	12.5	71.9	35.8	12.9
HCM Lane LOS	F	C	C	B	F	E	B
HCM 95th-tile Q	12.2	2	2.2	0.2	12.8	6.1	0.6



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	490	0	30	10	20	10	130	600	10	10	70	700
Future Volume (veh/h)	490	0	30	10	20	10	130	600	10	10	70	700
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776
Adj Flow Rate, veh/h	533	0	7	11	22	0	141	652	4	11	76	147
Adj No. of Lanes	2	1	1	2	1	1	1	3	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	696	538	449	46	187	159	179	1538	470	46	760	328
Arrive On Green	0.21	0.00	0.30	0.01	0.11	0.00	0.11	0.32	0.32	0.01	0.23	0.23
Sat Flow, veh/h	3281	1776	1482	3281	1776	1509	1691	4848	1482	3281	3374	1458
Grp Volume(v), veh/h	533	0	7	11	22	0	141	652	4	11	76	147
Grp Sat Flow(s),veh/h/ln	1640	1776	1482	1640	1776	1509	1691	1616	1482	1640	1687	1458
Q Serve(g_s), s	8.6	0.0	0.2	0.2	0.6	0.0	4.6	6.0	0.1	0.2	1.0	4.9
Cycle Q Clear(g_c), s	8.6	0.0	0.2	0.2	0.6	0.0	4.6	6.0	0.1	0.2	1.0	4.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	696	538	449	46	187	159	179	1538	470	46	760	328
V/C Ratio(X)	0.77	0.00	0.02	0.24	0.12	0.00	0.79	0.42	0.01	0.24	0.10	0.45
Avail Cap(c_a), veh/h	1130	1475	1231	291	1021	868	342	2875	879	291	1617	699
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.9	0.0	13.7	27.5	22.8	0.0	24.6	15.2	13.2	27.5	17.3	18.8
Incr Delay (d2), s/veh	1.8	0.0	0.0	2.6	0.3	0.0	7.4	0.2	0.0	2.6	0.1	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	0.0	0.1	0.1	0.3	0.0	2.5	2.7	0.0	0.1	0.5	2.0
LnGrp Delay(d),s/veh	22.7	0.0	13.8	30.1	23.1	0.0	32.0	15.4	13.2	30.1	17.4	19.8
LnGrp LOS	C		B	C	C		C	B	B	C	B	B
Approach Vol, veh/h		540			33			797			234	
Approach Delay, s/veh		22.6			25.4			18.3			19.5	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.4	23.2	5.4	22.4	10.6	18.0	16.5	11.2
Change Period (Y+Rc), s	4.6	5.3	4.6	5.3	4.6	5.3	4.6	5.3
Max Green Setting (Gmax), s	5.0	33.4	5.0	46.8	11.4	27.0	19.4	32.4
Max Q Clear Time (g_c+I1), s	2.2	8.0	2.2	2.2	6.6	6.9	10.6	2.6
Green Ext Time (p_c), s	0.0	5.4	0.0	0.1	0.1	5.0	1.3	0.1

Intersection Summary	
HCM 2010 Ctrl Delay	20.0
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	260	160	0	0	0	80	10	0	0	0	0	0	10	0	70
Future Vol, veh/h	0	260	160	0	0	0	80	10	0	0	0	0	0	10	0	70
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	0	283	174	0	0	0	87	11	0	0	0	0	0	11	0	76
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	11.1	8.8	0	8.8
HCM LOS	B	A	-	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	0%	0%	100%	0%	0%	0%	100%	0%
Vol Thru, %	100%	100%	0%	100%	100%	89%	0%	0%
Vol Right, %	0%	0%	0%	0%	0%	11%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	260	160	0	90	10	70
LT Vol	0	0	260	0	0	0	10	0
Through Vol	0	0	0	160	0	80	0	0
RT Vol	0	0	0	0	0	10	0	70
Lane Flow Rate	0	0	283	174	0	98	11	76
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0	0	0.427	0.238	0	0.142	0.02	0.111
Departure Headway (Hd)	6.109	6.109	5.438	4.936	5.299	5.22	6.479	5.269
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	0	0	664	729	0	687	553	680
Service Time	3.854	3.854	3.165	2.663	3.034	2.956	4.211	3.001
HCM Lane V/C Ratio	0	0	0.426	0.239	0	0.143	0.02	0.112
HCM Control Delay	8.9	8.9	12.2	9.2	8	8.8	9.3	8.7
HCM Lane LOS	N	N	B	A	N	A	A	A
HCM 95th-tile Q	0	0	2.1	0.9	0	0.5	0.1	0.4

Intersection	
Int Delay, s/veh	17.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	10	260	0	0	70	780	0	0	0	260	0	10
Future Vol, veh/h	10	260	0	0	70	780	0	0	0	260	0	10
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	11	283	0	0	76	848	0	0	0	283	0	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	929	0	0	288	0	0	819	1238	293	814	814	510
Stage 1	-	-	-	-	-	-	309	309	-	505	505	-
Stage 2	-	-	-	-	-	-	510	929	-	309	309	-
Critical Hdwy	4.17	-	-	4.17	-	-	7.17	6.57	6.27	7.17	6.57	6.27
Critical Hdwy Stg 1	-	-	-	-	-	-	6.17	5.57	-	6.17	5.57	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.17	5.57	-	6.17	5.57	-
Follow-up Hdwy	2.263	-	-	2.263	-	-	3.563	4.063	3.363	3.563	4.063	3.363
Pot Cap-1 Maneuver	716	-	-	1246	-	-	289	172	735	291	307	554
Stage 1	-	-	-	-	-	-	691	651	-	540	532	-
Stage 2	-	-	-	-	-	-	537	340	-	691	651	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	713	-	-	1241	-	-	278	168	729	285	300	549
Mov Cap-2 Maneuver	-	-	-	-	-	-	278	168	-	285	300	-
Stage 1	-	-	-	-	-	-	678	638	-	529	530	-
Stage 2	-	-	-	-	-	-	524	339	-	678	638	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0	0	87.9
HCM LOS			A	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	-	713	-	-	1241	-	-	285	549
HCM Lane V/C Ratio	-	-	0.015	-	-	-	-	-	0.992	0.02
HCM Control Delay (s)	0	0	10.1	-	-	0	-	-	90.8	11.7
HCM Lane LOS	A	A	B	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	-	-	0	-	-	0	-	-	10.1	0.1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	300	0	150	0	340	740	0	330	370
Future Volume (veh/h)	0	0	0	300	0	150	0	340	740	0	330	370
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		0.98	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1776	1776	1776	0	1776	1776	0	1776	1776
Adj Flow Rate, veh/h				326	0	29	0	370	363	0	359	181
Adj No. of Lanes				2	0	2	0	2	2	0	2	3
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				7	7	7	0	7	7	0	7	7
Cap, veh/h				605	0	540	0	1527	1174	0	1527	1520
Arrive On Green				0.18	0.00	0.18	0.00	0.45	0.45	0.00	0.45	0.45
Sat Flow, veh/h				3382	0	3019	0	3463	2593	0	3463	3359
Grp Volume(v), veh/h				326	0	29	0	370	363	0	359	181
Grp Sat Flow(s),veh/h/ln				1691	0	1509	0	1687	1297	0	1687	1120
Q Serve(g_s), s				2.4	0.0	0.2	0.0	1.8	2.4	0.0	1.8	0.8
Cycle Q Clear(g_c), s				2.4	0.0	0.2	0.0	1.8	2.4	0.0	1.8	0.8
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				605	0	540	0	1527	1174	0	1527	1520
V/C Ratio(X)				0.54	0.00	0.05	0.00	0.24	0.31	0.00	0.24	0.12
Avail Cap(c_a), veh/h				1561	0	1393	0	3478	2674	0	3478	3463
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				10.0	0.0	9.1	0.0	4.5	4.7	0.0	4.5	4.3
Incr Delay (d2), s/veh				0.7	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.1	0.0	0.1	0.0	0.8	0.9	0.0	0.8	0.3
LnGrp Delay(d),s/veh				10.8	0.0	9.2	0.0	4.6	4.8	0.0	4.6	4.3
LnGrp LOS				B		A		A	A		A	A
Approach Vol, veh/h					355			733			540	
Approach Delay, s/veh					10.6			4.7			4.5	
Approach LOS					B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		17.5				17.5		9.4
Change Period (Y+Rc), s		5.3				5.3		4.6
Max Green Setting (Gmax), s		27.7				27.7		12.4
Max Q Clear Time (g_c+I1), s		4.4				3.8		4.4
Green Ext Time (p_c), s		7.6				7.6		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	5.9
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	190	0	280	0	0	0	0	890	210	0	500	130
Future Volume (veh/h)	190	0	280	0	0	0	0	890	210	0	500	130
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776				0	1776	1776	0	1776	1776
Adj Flow Rate, veh/h	207	0	49				0	967	0	0	543	0
Adj No. of Lanes	2	0	3				0	3	1	0	2	1
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7				0	7	7	0	7	7
Cap, veh/h	486	0	650				0	2601	810	0	1810	810
Arrive On Green	0.14	0.00	0.14				0.00	0.54	0.00	0.00	0.54	0.00
Sat Flow, veh/h	3382	0	4528				0	5007	1509	0	3463	1509
Grp Volume(v), veh/h	207	0	49				0	967	0	0	543	0
Grp Sat Flow(s),veh/h/ln	1691	0	1509				0	1616	1509	0	1687	1509
Q Serve(g_s), s	1.7	0.0	0.3				0.0	3.6	0.0	0.0	2.8	0.0
Cycle Q Clear(g_c), s	1.7	0.0	0.3				0.0	3.6	0.0	0.0	2.8	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	486	0	650				0	2601	810	0	1810	810
V/C Ratio(X)	0.43	0.00	0.08				0.00	0.37	0.00	0.00	0.30	0.00
Avail Cap(c_a), veh/h	1355	0	1814				0	4338	1351	0	3019	1351
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	12.1	0.0	11.5				0.0	4.2	0.0	0.0	4.0	0.0
Incr Delay (d2), s/veh	0.6	0.0	0.0				0.0	0.1	0.0	0.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	0.1				0.0	1.5	0.0	0.0	1.2	0.0
LnGrp Delay(d),s/veh	12.7	0.0	11.5				0.0	4.2	0.0	0.0	4.1	0.0
LnGrp LOS	B		B					A			A	
Approach Vol, veh/h		256						967			543	
Approach Delay, s/veh		12.5						4.2			4.1	
Approach LOS		B						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		21.9		9.0		21.9		
Change Period (Y+Rc), s		5.3		4.6		5.3		
Max Green Setting (Gmax), s		27.7		12.4		27.7		
Max Q Clear Time (g_c+I1), s		5.6		3.7		4.8		
Green Ext Time (p_c), s		11.0		0.6		11.2		

Intersection Summary	
HCM 2010 Ctrl Delay	5.4
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Intersection Delay, s/veh	54.8
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	70	410	60	0	210	230	90	0	30	100	150
Future Vol, veh/h	0	70	410	60	0	210	230	90	0	30	100	150
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	0	74	436	64	0	223	245	96	0	32	106	160
Number of Lanes	0	1	1	0	0	1	1	1	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	3	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	3
HCM Control Delay	70.8	24.1	36
HCM LOS	F	C	E

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1
Vol Left, %	11%	100%	0%	100%	0%	0%	41%
Vol Thru, %	36%	0%	87%	0%	100%	0%	49%
Vol Right, %	54%	0%	13%	0%	0%	100%	10%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	280	70	470	210	230	90	590
LT Vol	30	70	0	210	0	0	240
Through Vol	100	0	410	0	230	0	290
RT Vol	150	0	60	0	0	90	60
Lane Flow Rate	298	74	500	223	245	96	628
Geometry Grp	7	8	8	7	7	7	7
Degree of Util (X)	0.761	0.215	1	0.603	0.626	0.226	1
Departure Headway (Hd)	9.201	10.407	9.818	9.712	9.213	8.513	9.304
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	393	347	375	371	391	421	395
Service Time	6.954	8.107	7.518	7.471	6.971	6.272	7.004
HCM Lane V/C Ratio	0.758	0.213	1.333	0.601	0.627	0.228	1.59
HCM Control Delay	36	15.9	79	26.2	26.3	13.8	76.7
HCM Lane LOS	E	C	F	D	D	B	F
HCM 95th-tile Q	6.2	0.8	11.7	3.8	4.1	0.9	12

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	240	290	60
Future Vol, veh/h	0	240	290	60
Peak Hour Factor	0.94	0.94	0.94	0.94
Heavy Vehicles, %	4	4	4	4
Mvmt Flow	0	255	309	64
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	3
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	76.7
HCM LOS	F

Lane

Intersection	
Intersection Delay, s/veh	47.2
Intersection LOS	E

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	40	100	0	0	180	110	120	0	0	100	70	0	490	330	60
Future Vol, veh/h	0	40	100	0	0	180	110	120	0	0	100	70	0	490	330	60
Peak Hour Factor	0.88	0.92	0.92	0.92	0.88	0.92	0.92	0.92	0.88	0.92	0.92	0.92	0.88	0.92	0.92	0.92
Heavy Vehicles, %	7	0	1	4	7	4	1	3	7	4	4	4	7	0	4	0
Mvmt Flow	0	43	109	0	0	196	120	130	0	0	109	76	0	533	359	65
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	14.4	35.1	14.5	64.3
HCM LOS	B	E	B	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	29%	44%	56%
Vol Thru, %	59%	71%	27%	38%
Vol Right, %	41%	0%	29%	7%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	170	140	410	880
LT Vol	0	40	180	490
Through Vol	100	100	110	330
RT Vol	70	0	120	60
Lane Flow Rate	185	152	446	957
Geometry Grp	1	1	1	1
Degree of Util (X)	0.369	0.324	0.833	1
Departure Headway (Hd)	7.19	7.661	6.73	6.556
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	497	469	539	555
Service Time	5.272	5.73	4.774	4.643
HCM Lane V/C Ratio	0.372	0.324	0.827	1.724
HCM Control Delay	14.5	14.4	35.1	64.3
HCM Lane LOS	B	B	E	F
HCM 95th-tile Q	1.7	1.4	8.5	14.3



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	290	550	180	260	350	310	60	630	300	210	740	150
Future Volume (veh/h)	290	550	180	260	350	310	60	630	300	210	740	150
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.97	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1854	1900	1863	1900	1900	1759	1881	1863	1881	1881	1759
Adj Flow Rate, veh/h	315	598	171	283	380	213	65	685	225	228	804	100
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	2	2	2	0	0	8	1	2	1	1	8
Cap, veh/h	320	597	170	286	458	252	77	700	581	230	856	671
Arrive On Green	0.18	0.22	0.21	0.16	0.21	0.19	0.05	0.37	0.37	0.13	0.45	0.45
Sat Flow, veh/h	1792	2671	762	1774	2219	1222	1675	1881	1560	1792	1881	1474
Grp Volume(v), veh/h	315	394	375	283	308	285	65	685	225	228	804	100
Grp Sat Flow(s),veh/h/ln	1792	1761	1672	1774	1805	1636	1675	1881	1560	1792	1881	1474
Q Serve(g_s), s	24.5	31.3	31.3	22.3	22.8	23.5	5.4	50.3	14.8	17.8	56.9	5.6
Cycle Q Clear(g_c), s	24.5	31.3	31.3	22.3	22.8	23.5	5.4	50.3	14.8	17.8	56.9	5.6
Prop In Lane	1.00		0.46	1.00		0.75	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	320	394	374	286	373	338	77	700	581	230	856	671
V/C Ratio(X)	0.98	1.00	1.00	0.99	0.83	0.84	0.85	0.98	0.39	0.99	0.94	0.15
Avail Cap(c_a), veh/h	320	394	374	286	373	338	77	700	581	230	856	671
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.3	54.3	54.7	58.6	53.1	54.0	66.3	43.4	32.2	60.9	36.3	22.3
Incr Delay (d2), s/veh	46.0	45.3	47.6	49.8	14.2	17.5	55.4	28.6	0.4	56.3	17.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.2	20.2	19.4	14.9	12.8	12.3	3.7	31.6	6.4	12.4	33.7	2.3
LnGrp Delay(d),s/veh	103.3	99.6	102.3	108.4	67.3	71.5	121.7	72.0	32.7	117.2	54.1	22.4
LnGrp LOS	F	F	F	F	E	E	F	E	C	F	D	C
Approach Vol, veh/h		1084			876			975			1132	
Approach Delay, s/veh		101.6			81.9			66.2			64.0	
Approach LOS		F			F			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	56.1	26.6	35.3	10.4	67.7	29.0	32.9
Change Period (Y+Rc), s	5.3	5.3	5.7	5.7	5.3	5.3	5.7	5.7
Max Green Setting (Gmax), s	16.7	50.8	20.9	29.6	5.1	62.4	23.3	27.2
Max Q Clear Time (g_c+I1), s	9.8	52.3	24.3	33.3	7.4	58.9	26.5	25.5
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	2.8	0.0	1.2

Intersection Summary	
HCM 2010 Ctrl Delay	78.4
HCM 2010 LOS	E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	290	120	880	300	120	100	790	670	300	60	880	290
Future Volume (veh/h)	290	120	880	300	120	100	790	670	300	60	880	290
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827
Adj Flow Rate, veh/h	309	128	642	319	128	25	840	713	158	64	936	185
Adj No. of Lanes	2	1	1	2	1	1	2	2	1	1	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	364	547	455	368	549	457	780	1514	660	81	873	384
Arrive On Green	0.11	0.30	0.30	0.11	0.30	0.30	0.23	0.44	0.44	0.05	0.25	0.25
Sat Flow, veh/h	3375	1827	1521	3375	1827	1521	3375	3471	1513	1740	3471	1525
Grp Volume(v), veh/h	309	128	642	319	128	25	840	713	158	64	936	185
Grp Sat Flow(s),veh/h/ln	1688	1827	1521	1688	1827	1521	1688	1736	1513	1740	1736	1525
Q Serve(g_s), s	13.2	7.8	44.0	13.7	7.8	1.7	34.0	21.4	9.7	5.4	37.0	15.2
Cycle Q Clear(g_c), s	13.2	7.8	44.0	13.7	7.8	1.7	34.0	21.4	9.7	5.4	37.0	15.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	364	547	455	368	549	457	780	1514	660	81	873	384
V/C Ratio(X)	0.85	0.23	1.41	0.87	0.23	0.05	1.08	0.47	0.24	0.79	1.07	0.48
Avail Cap(c_a), veh/h	528	547	455	436	549	457	780	1514	660	142	873	384
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.4	38.8	51.5	64.4	38.7	36.6	56.5	29.4	26.1	69.4	55.0	46.9
Incr Delay (d2), s/veh	8.6	0.2	197.7	14.7	0.2	0.0	54.7	1.1	0.9	15.5	51.5	4.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.6	3.9	43.4	7.1	3.9	0.7	21.8	10.5	4.2	2.9	24.0	6.9
LnGrp Delay(d),s/veh	73.0	39.0	249.2	79.1	38.9	36.6	111.3	30.5	26.9	84.8	106.6	51.1
LnGrp LOS	E	D	F	E	D	D	F	C	C	F	F	D
Approach Vol, veh/h		1079			472			1711			1185	
Approach Delay, s/veh		173.8			66.0			69.8			96.7	
Approach LOS		F			E			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.9	68.1	20.0	48.0	38.0	41.0	19.9	48.2
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	12.6	59.0	19.0	44.0	34.0	37.0	23.0	40.0
Max Q Clear Time (g_c+I1), s	7.4	23.4	15.7	46.0	36.0	39.0	15.2	9.8
Green Ext Time (p_c), s	0.0	18.4	0.4	0.0	0.0	0.0	0.7	4.5

Intersection Summary	
HCM 2010 Ctrl Delay	101.8
HCM 2010 LOS	F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	560	0	640	280	1120	0	0	1490	570
Future Volume (veh/h)	0	0	0	560	0	640	280	1120	0	0	1490	570
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1827	1827	1827	1827	0	0	1827	1827
Adj Flow Rate, veh/h				596	0	587	298	1191	0	0	1585	505
Adj No. of Lanes				0	1	1	1	1	0	0	1	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %				4	4	4	4	4	0	0	4	4
Cap, veh/h				424	0	379	199	1290	0	0	1050	874
Arrive On Green				0.24	0.00	0.24	0.11	0.71	0.00	0.00	0.57	0.57
Sat Flow, veh/h				1740	0	1553	1740	1827	0	0	1827	1520
Grp Volume(v), veh/h				596	0	587	298	1191	0	0	1585	505
Grp Sat Flow(s),veh/h/ln				1740	0	1553	1740	1827	0	0	1827	1520
Q Serve(g_s), s				39.0	0.0	39.0	18.3	88.0	0.0	0.0	92.0	33.8
Cycle Q Clear(g_c), s				39.0	0.0	39.0	18.3	88.0	0.0	0.0	92.0	33.8
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				424	0	379	199	1290	0	0	1050	874
V/C Ratio(X)				1.41	0.00	1.55	1.50	0.92	0.00	0.00	1.51	0.58
Avail Cap(c_a), veh/h				424	0	379	199	1290	0	0	1050	874
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				60.5	0.0	60.5	70.8	19.8	0.0	0.0	34.0	21.6
Incr Delay (d2), s/veh				196.1	0.0	260.6	248.4	11.2	0.0	0.0	233.9	1.1
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				41.8	0.0	44.1	22.5	48.0	0.0	0.0	114.4	14.4
LnGrp Delay(d),s/veh				256.6	0.0	321.1	319.2	31.0	0.0	0.0	267.9	22.7
LnGrp LOS				F		F	F	C			F	C
Approach Vol, veh/h					1183			1489			2090	
Approach Delay, s/veh					288.6			88.7			208.7	
Approach LOS					F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		117.0			21.0	96.0		43.0
Change Period (Y+Rc), s		5.3			4.0	5.3		4.6
Max Green Setting (Gmax), s		111.7			17.0	90.7		38.4
Max Q Clear Time (g_c+I1), s		90.0			20.3	94.0		41.0
Green Ext Time (p_c), s		20.9			0.0	0.0		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		191.0
HCM 2010 LOS		F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	650	0	470	0	0	0	0	750	330	780	1270	0
Future Volume (veh/h)	650	0	470	0	0	0	0	750	330	780	1270	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1827				0	1827	1827	1827	1827	0
Adj Flow Rate, veh/h	691	0	444				0	798	272	830	1351	0
Adj No. of Lanes	0	1	1				0	1	1	1	1	0
Peak Hour Factor	0.94	0.94	0.94				0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4				0	4	4	4	4	0
Cap, veh/h	489	0	437				0	571	474	576	1222	0
Arrive On Green	0.28	0.00	0.28				0.00	0.31	0.31	0.33	0.67	0.00
Sat Flow, veh/h	1740	0	1553				0	1827	1518	1740	1827	0
Grp Volume(v), veh/h	691	0	444				0	798	272	830	1351	0
Grp Sat Flow(s),veh/h/ln	1740	0	1553				0	1827	1518	1740	1827	0
Q Serve(g_s), s	45.0	0.0	45.0				0.0	50.0	24.0	53.0	107.0	0.0
Cycle Q Clear(g_c), s	45.0	0.0	45.0				0.0	50.0	24.0	53.0	107.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	489	0	437				0	571	474	576	1222	0
V/C Ratio(X)	1.41	0.00	1.02				0.00	1.40	0.57	1.44	1.11	0.00
Avail Cap(c_a), veh/h	489	0	437				0	571	474	576	1222	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	57.5	0.0	57.5				0.0	55.0	46.1	53.5	26.5	0.0
Incr Delay (d2), s/veh	197.3	0.0	47.3				0.0	189.5	1.6	207.8	59.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	48.4	0.0	25.0				0.0	55.3	10.3	58.7	73.6	0.0
LnGrp Delay(d),s/veh	254.8	0.0	104.8				0.0	244.5	47.7	261.3	86.4	0.0
LnGrp LOS	F		F					F	D	F	F	
Approach Vol, veh/h		1135						1070			2181	
Approach Delay, s/veh		196.1						194.4			152.9	
Approach LOS		F						F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	57.0	54.0		49.0		111.0		
Change Period (Y+Rc), s	4.0	5.3		4.6		5.3		
Max Green Setting (Gmax), s	53.0	48.7		44.4		105.7		
Max Q Clear Time (g_c+I1), s	55.0	52.0		47.0		109.0		
Green Ext Time (p_c), s	0.0	0.0		0.0		0.0		

Intersection Summary	
HCM 2010 Ctrl Delay	174.2
HCM 2010 LOS	F

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	190	20	10	50	50	430	20	460	30	490	940	310
Future Vol, veh/h	190	20	10	50	50	430	20	460	30	490	940	310
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	340	-	0	210	-	210	175	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	202	21	11	53	53	457	21	489	32	521	1000	330

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2602	2575	1002	2585	2575	491	1000	0	0	489	0	0
Stage 1	2043	2043	-	532	532	-	-	-	-	-	-	-
Stage 2	559	532	-	2053	2043	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.236	-	-	2.236	-	-
Pot Cap-1 Maneuver	~ 16	25	292	~ 17	~ 25	573	684	-	-	1064	-	-
Stage 1	~ 72	98	-	528	522	-	-	-	-	-	-	-
Stage 2	510	522	-	71	98	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 12	292	-	~ 12	572	683	-	-	1062	-	-
Mov Cap-2 Maneuver	-	~ 12	-	-	~ 12	-	-	-	-	-	-	-
Stage 1	~ 70	50	-	512	506	-	-	-	-	-	-	-
Stage 2	~ 88	506	-	~ 20	~ 50	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0.4	3.3
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBL	SBT	SBR
Capacity (veh/h)	683	-	-	-	292	-	12	572	1062	-	-
HCM Lane V/C Ratio	0.031	-	-	-	0.036	-	4.433	0.8	0.491	-	-
HCM Control Delay (s)	10.4	-	-	-	17.8	-	$ 2170.5	31.8	11.6	-	-
HCM Lane LOS	B	-	-	-	C	-	F	D	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1	-	7.7	7.8	2.8	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Intersection Delay, s/veh	49.3
Intersection LOS	E

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	110	100	100	0	50	50	140	0	40	280	20
Future Vol, veh/h	0	110	100	100	0	50	50	140	0	40	280	20
Peak Hour Factor	0.88	0.92	0.92	0.92	0.88	0.92	0.92	0.92	0.88	0.92	0.92	0.92
Heavy Vehicles, %	7	1	0	4	7	7	0	1	7	3	4	0
Mvmt Flow	0	120	109	109	0	54	54	152	0	43	304	22
Number of Lanes	0	0	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	31.1	17.3	35.5
HCM LOS	D	C	E

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	12%	35%	100%	0%	25%
Vol Thru, %	82%	32%	0%	26%	53%
Vol Right, %	6%	32%	0%	74%	22%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	340	310	50	190	920
LT Vol	40	110	50	0	230
Through Vol	280	100	0	50	490
RT Vol	20	100	0	140	200
Lane Flow Rate	370	337	54	207	1000
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.8	0.746	0.141	0.472	1
Departure Headway (Hd)	7.79	7.969	9.362	8.226	7.458
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	466	455	383	438	490
Service Time	5.84	6.018	7.115	5.979	5.534
HCM Lane V/C Ratio	0.794	0.741	0.141	0.473	2.041
HCM Control Delay	35.5	31.1	13.7	18.2	68.8
HCM Lane LOS	E	D	B	C	F
HCM 95th-tile Q	7.3	6.2	0.5	2.5	13.4

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	230	490	200
Future Vol, veh/h	0	230	490	200
Peak Hour Factor	0.88	0.92	0.92	0.92
Heavy Vehicles, %	7	2	7	2
Mvmt Flow	0	250	533	217
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	68.8
HCM LOS	F

Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	470	0	360	500	970	0	0	1030	350
Future Volume (veh/h)	0	0	0	470	0	360	500	970	0	0	1030	350
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1827	1827	1827	1827	0	0	1827	1827
Adj Flow Rate, veh/h				511	0	255	543	1054	0	0	1120	289
Adj No. of Lanes				0	1	1	1	1	0	0	1	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				4	4	4	4	4	0	0	4	4
Cap, veh/h				391	0	349	413	1325	0	0	845	702
Arrive On Green				0.22	0.00	0.22	0.24	0.73	0.00	0.00	0.46	0.46
Sat Flow, veh/h				1740	0	1553	1740	1827	0	0	1827	1517
Grp Volume(v), veh/h				511	0	255	543	1054	0	0	1120	289
Grp Sat Flow(s),veh/h/ln				1740	0	1553	1740	1827	0	0	1827	1517
Q Serve(g_s), s				36.0	0.0	24.4	38.0	60.0	0.0	0.0	74.0	20.2
Cycle Q Clear(g_c), s				36.0	0.0	24.4	38.0	60.0	0.0	0.0	74.0	20.2
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				391	0	349	413	1325	0	0	845	702
V/C Ratio(X)				1.31	0.00	0.73	1.31	0.80	0.00	0.00	1.33	0.41
Avail Cap(c_a), veh/h				391	0	349	413	1325	0	0	845	702
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				62.0	0.0	57.5	61.0	14.3	0.0	0.0	43.0	28.6
Incr Delay (d2), s/veh				154.8	0.0	6.6	157.7	3.2	0.0	0.0	154.7	0.1
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				34.1	0.0	11.1	36.3	31.0	0.0	0.0	73.6	8.5
LnGrp Delay(d),s/veh				216.8	0.0	64.1	218.7	17.5	0.0	0.0	197.7	28.7
LnGrp LOS				F		E	F	B			F	C
Approach Vol, veh/h					766			1597			1409	
Approach Delay, s/veh					166.0			85.9			163.0	
Approach LOS					F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		120.0			42.0	78.0		40.0
Change Period (Y+Rc), s		4.9			4.0	4.9		4.9
Max Green Setting (Gmax), s		115.1			38.0	73.1		35.1
Max Q Clear Time (g_c+I1), s		62.0			40.0	76.0		38.0
Green Ext Time (p_c), s		0.6			0.0	0.0		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		131.0
HCM 2010 LOS		F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	470	0	770	0	0	0	0	1000	310	410	1090	0
Future Volume (veh/h)	470	0	770	0	0	0	0	1000	310	410	1090	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1827				0	1827	1900	1827	1827	0
Adj Flow Rate, veh/h	511	0	755				0	1087	329	446	1185	0
Adj No. of Lanes	0	1	1				0	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4				0	4	4	4	4	0
Cap, veh/h	489	0	437				0	653	198	272	1222	0
Arrive On Green	0.28	0.00	0.28				0.00	0.49	0.48	0.16	0.67	0.00
Sat Flow, veh/h	1740	0	1553				0	1339	405	1740	1827	0
Grp Volume(v), veh/h	511	0	755				0	0	1416	446	1185	0
Grp Sat Flow(s),veh/h/ln	1740	0	1553				0	0	1744	1740	1827	0
Q Serve(g_s), s	45.0	0.0	45.0				0.0	0.0	78.0	25.0	97.8	0.0
Cycle Q Clear(g_c), s	45.0	0.0	45.0				0.0	0.0	78.0	25.0	97.8	0.0
Prop In Lane	1.00		1.00				0.00		0.23	1.00		0.00
Lane Grp Cap(c), veh/h	489	0	437				0	0	850	272	1222	0
V/C Ratio(X)	1.04	0.00	1.73				0.00	0.00	1.67	1.64	0.97	0.00
Avail Cap(c_a), veh/h	489	0	437				0	0	850	272	1222	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	57.5	0.0	57.5				0.0	0.0	41.1	67.5	25.0	0.0
Incr Delay (d2), s/veh	52.7	0.0	337.4				0.0	0.0	304.6	304.3	18.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	28.8	0.0	60.2				0.0	0.0	109.5	35.0	55.1	0.0
LnGrp Delay(d),s/veh	110.2	0.0	394.9				0.0	0.0	345.7	371.8	43.8	0.0
LnGrp LOS	F		F						F	F	D	
Approach Vol, veh/h		1266						1416			1631	
Approach Delay, s/veh		280.0						345.7			133.5	
Approach LOS		F						F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	29.0	82.0		49.0		111.0		
Change Period (Y+Rc), s	4.0	4.9		4.9		4.9		
Max Green Setting (Gmax), s	25.0	77.1		44.1		106.1		
Max Q Clear Time (g_c+I1), s	27.0	80.0		47.0		99.8		
Green Ext Time (p_c), s	0.0	0.0		0.0		0.6		

Intersection Summary	
HCM 2010 Ctrl Delay	246.2
HCM 2010 LOS	F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	490	40	40	70	50	200	20	500	30	370	1020	360
Future Volume (veh/h)	490	40	40	70	50	200	20	500	30	370	1020	360
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.95	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1900	1827	1827	1827	1827	1827	1827	1827	1827	1900
Adj Flow Rate, veh/h	521	43	17	74	53	3	21	532	10	394	1085	357
Adj No. of Lanes	1	1	0	2	1	2	1	1	1	2	2	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	548	408	161	130	96	136	29	669	560	467	1250	405
Arrive On Green	0.32	0.33	0.33	0.04	0.05	0.05	0.02	0.37	0.37	0.14	0.49	0.49
Sat Flow, veh/h	1740	1241	491	3375	1827	2589	1740	1827	1530	3375	2562	831
Grp Volume(v), veh/h	521	0	60	74	53	3	21	532	10	394	730	712
Grp Sat Flow(s),veh/h/ln	1740	0	1731	1688	1827	1295	1740	1827	1530	1688	1736	1657
Q Serve(g_s), s	36.6	0.0	3.0	2.7	3.5	0.1	1.5	32.6	0.5	14.2	46.5	48.3
Cycle Q Clear(g_c), s	36.6	0.0	3.0	2.7	3.5	0.1	1.5	32.6	0.5	14.2	46.5	48.3
Prop In Lane	1.00		0.28	1.00		1.00	1.00		1.00	1.00		0.50
Lane Grp Cap(c), veh/h	548	0	570	130	96	136	29	669	560	467	847	808
V/C Ratio(X)	0.95	0.00	0.11	0.57	0.55	0.02	0.73	0.80	0.02	0.84	0.86	0.88
Avail Cap(c_a), veh/h	598	0	596	432	234	331	56	669	560	729	847	808
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.9	0.0	29.1	59.1	57.8	56.2	61.2	35.4	25.3	52.5	28.3	28.8
Incr Delay (d2), s/veh	24.1	0.0	0.1	3.9	4.9	0.1	29.2	9.5	0.1	5.4	11.2	13.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	21.2	0.0	1.4	1.3	1.9	0.1	1.0	18.2	0.2	7.0	24.7	24.9
LnGrp Delay(d),s/veh	65.9	0.0	29.2	63.0	62.7	56.3	90.4	44.9	25.3	57.9	39.5	42.0
LnGrp LOS	E		C	E	E	E	F	D	C	E	D	D
Approach Vol, veh/h		581			130			563			1836	
Approach Delay, s/veh		62.1			62.7			46.3			44.4	
Approach LOS		E			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.3	49.8	8.8	45.1	6.1	65.0	43.4	10.6
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	17.3	38.0	16.0	43.0	4.0	61.0	43.0	16.0
Max Q Clear Time (g_c+I1), s	16.2	34.6	4.7	5.0	3.5	50.3	38.6	5.5
Green Ext Time (p_c), s	1.1	3.0	0.1	0.6	0.0	8.3	0.8	0.3

Intersection Summary	
HCM 2010 Ctrl Delay	48.8
HCM 2010 LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Intersection Delay, s/veh	63.7
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	100	390	40	0	20	130	270	0	10	200	30	0	390	530	220
Future Vol, veh/h	0	100	390	40	0	20	130	270	0	10	200	30	0	390	530	220
Peak Hour Factor	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94
Heavy Vehicles, %	7	4	4	4	7	4	4	4	7	4	4	4	7	4	4	4
Mvmt Flow	0	106	415	43	0	21	138	287	0	11	213	32	0	415	564	234
Number of Lanes	0	1	1	0	0	1	1	0	0	0	1	0	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	2	2
HCM Control Delay	64.7	71.6	35.3	66.4
HCM LOS	F	F	E	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	4%	100%	0%	100%	0%	42%	0%
Vol Thru, %	83%	0%	91%	0%	32%	58%	0%
Vol Right, %	12%	0%	9%	0%	68%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	240	100	430	20	400	920	220
LT Vol	10	100	0	20	0	390	0
Through Vol	200	0	390	0	130	530	0
RT Vol	30	0	40	0	270	0	220
Lane Flow Rate	255	106	457	21	426	979	234
Geometry Grp	6	7	7	7	7	7	7
Degree of Util (X)	0.718	0.287	1	0.057	1	1	0.552
Departure Headway (Hd)	10.117	9.714	9.15	9.704	8.733	9.404	8.493
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	357	372	403	368	413	401	428
Service Time	8.178	7.415	6.85	7.491	6.52	7.105	6.194
HCM Lane V/C Ratio	0.714	0.285	1.134	0.057	1.031	2.441	0.547
HCM Control Delay	35.3	16.3	76	13.1	74.5	77.2	21.2
HCM Lane LOS	E	C	F	B	F	F	C
HCM 95th-tile Q	5.3	1.2	12.1	0.2	12.4	12	3.3



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	970	20	100	10	20	10	40	210	10	40	770	600
Future Volume (veh/h)	970	20	100	10	20	10	40	210	10	40	770	600
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827
Adj Flow Rate, veh/h	1032	21	41	11	21	0	43	223	4	43	819	211
Adj No. of Lanes	2	1	1	2	1	1	1	3	1	2	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	1159	733	612	176	200	170	90	1523	466	120	1003	435
Arrive On Green	0.34	0.40	0.40	0.05	0.11	0.00	0.05	0.31	0.31	0.04	0.29	0.29
Sat Flow, veh/h	3375	1827	1527	3375	1827	1553	1740	4988	1525	3375	3471	1505
Grp Volume(v), veh/h	1032	21	41	11	21	0	43	223	4	43	819	211
Grp Sat Flow(s),veh/h/ln	1688	1827	1527	1688	1827	1553	1740	1663	1525	1688	1736	1505
Q Serve(g_s), s	27.8	0.7	1.6	0.3	1.0	0.0	2.3	3.1	0.2	1.2	21.1	11.1
Cycle Q Clear(g_c), s	27.8	0.7	1.6	0.3	1.0	0.0	2.3	3.1	0.2	1.2	21.1	11.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	1159	733	612	176	200	170	90	1523	466	120	1003	435
V/C Ratio(X)	0.89	0.03	0.07	0.06	0.10	0.00	0.48	0.15	0.01	0.36	0.82	0.49
Avail Cap(c_a), veh/h	1433	1296	1083	176	616	523	90	1655	506	179	1155	501
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.8	17.4	17.7	43.3	38.5	0.0	44.3	24.3	23.3	45.3	31.8	28.3
Incr Delay (d2), s/veh	6.3	0.0	0.0	0.1	0.2	0.0	3.8	0.0	0.0	1.8	4.1	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.9	0.3	0.7	0.1	0.5	0.0	1.2	1.4	0.1	0.6	10.7	4.7
LnGrp Delay(d),s/veh	36.1	17.5	17.8	43.5	38.8	0.0	48.1	24.3	23.3	47.1	35.9	29.1
LnGrp LOS	D	B	B	D	D		D	C	C	D	D	C
Approach Vol, veh/h		1094			32			270			1073	
Approach Delay, s/veh		35.1			40.4			28.1			35.0	
Approach LOS		D			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.0	34.7	9.6	43.9	9.6	33.1	37.6	15.8
Change Period (Y+Rc), s	4.6	5.3	4.6	5.3	4.6	5.3	4.6	5.3
Max Green Setting (Gmax), s	5.1	31.9	5.0	68.2	5.0	32.0	40.8	32.4
Max Q Clear Time (g_c+I1), s	3.2	5.1	2.3	3.6	4.3	23.1	29.8	3.0
Green Ext Time (p_c), s	0.0	8.3	0.0	0.3	0.0	4.7	3.2	0.3

Intersection Summary	
HCM 2010 Ctrl Delay	34.4
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	11.1
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	130	130	0	0	0	160	10	0	0	0	0	0	10	0	290
Future Vol, veh/h	0	130	130	0	0	0	160	10	0	0	0	0	0	10	0	290
Peak Hour Factor	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94
Heavy Vehicles, %	7	4	4	4	7	4	4	4	7	4	4	4	7	4	4	4
Mvmt Flow	0	138	138	0	0	0	170	11	0	0	0	0	0	11	0	309
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	10.4	10.9	0	11.7
HCM LOS	B	B	-	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	0%	0%	100%	0%	0%	0%	100%	0%
Vol Thru, %	100%	100%	0%	100%	100%	94%	0%	0%
Vol Right, %	0%	0%	0%	0%	0%	6%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	130	130	0	170	10	290
LT Vol	0	0	130	0	0	0	10	0
Through Vol	0	0	0	130	0	160	0	0
RT Vol	0	0	0	0	0	10	0	290
Lane Flow Rate	0	0	138	138	0	181	11	309
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0	0	0.238	0.219	0	0.291	0.019	0.435
Departure Headway (Hd)	6.334	6.334	6.2	5.695	5.836	5.794	6.281	5.071
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	0	0	582	633	0	624	565	700
Service Time	4.06	4.06	3.906	3.4	3.543	3.501	4.078	2.867
HCM Lane V/C Ratio	0	0	0.237	0.218	0	0.29	0.019	0.441
HCM Control Delay	9.1	9.1	10.8	10	8.5	10.9	9.2	11.8
HCM Lane LOS	N	N	B	A	N	B	A	B
HCM 95th-tile Q	0	0	0.9	0.8	0	1.2	0.1	2.2

Intersection	
Int Delay, s/veh	466.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	10	130	0	0	290	370	0	0	0	960	0	10
Future Vol, veh/h	10	130	0	0	290	370	0	0	0	960	0	10
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	11	138	0	0	309	394	0	0	0	1021	0	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	707	0	0	143	0	0	681	872	148	675	675	515
Stage 1	-	-	-	-	-	-	165	165	-	510	510	-
Stage 2	-	-	-	-	-	-	516	707	-	165	165	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.14	6.54	6.24	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-
Follow-up Hdwy	2.236	-	-	2.236	-	-	3.536	4.036	3.336	3.536	4.036	3.336
Pot Cap-1 Maneuver	882	-	-	1427	-	-	362	287	894	~ 365	373	556
Stage 1	-	-	-	-	-	-	832	758	-	~ 542	534	-
Stage 2	-	-	-	-	-	-	538	435	-	~ 832	758	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	878	-	-	1421	-	-	349	281	887	~ 359	365	551
Mov Cap-2 Maneuver	-	-	-	-	-	-	349	281	-	~ 359	365	-
Stage 1	-	-	-	-	-	-	818	745	-	~ 533	532	-
Stage 2	-	-	-	-	-	-	525	433	-	~ 818	745	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0	0	$ 851.7
HCM LOS			A	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	-	878	-	-	1421	-	-	359	551
HCM Lane V/C Ratio	-	-	0.012	-	-	-	-	-	2.845	0.019
HCM Control Delay (s)	0	0	9.2	-	-	0	-	-	$ 860.4	11.7
HCM Lane LOS	A	A	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	-	-	0	-	-	0	-	-	87.2	0.1

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	240	0	210	0	550	500	0	460	340
Future Volume (veh/h)	0	0	0	240	0	210	0	550	500	0	460	340
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		0.98	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1776	1776	1776	0	1776	1776	0	1776	1776
Adj Flow Rate, veh/h				261	0	37	0	598	258	0	500	177
Adj No. of Lanes				2	0	2	0	2	2	0	2	3
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				7	7	7	0	7	7	0	7	7
Cap, veh/h				518	0	463	0	1738	1337	0	1738	1732
Arrive On Green				0.15	0.00	0.15	0.00	0.52	0.52	0.00	0.52	0.52
Sat Flow, veh/h				3382	0	3019	0	3463	2594	0	3463	3361
Grp Volume(v), veh/h				261	0	37	0	598	258	0	500	177
Grp Sat Flow(s),veh/h/ln				1691	0	1509	0	1687	1297	0	1687	1120
Q Serve(g_s), s				2.1	0.0	0.3	0.0	3.1	1.6	0.0	2.5	0.8
Cycle Q Clear(g_c), s				2.1	0.0	0.3	0.0	3.1	1.6	0.0	2.5	0.8
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				518	0	463	0	1738	1337	0	1738	1732
V/C Ratio(X)				0.50	0.00	0.08	0.00	0.34	0.19	0.00	0.29	0.10
Avail Cap(c_a), veh/h				1291	0	1152	0	3242	2493	0	3242	3230
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				11.6	0.0	10.8	0.0	4.3	3.9	0.0	4.1	3.7
Incr Delay (d2), s/veh				0.8	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.0	0.0	0.1	0.0	1.4	0.6	0.0	1.1	0.2
LnGrp Delay(d),s/veh				12.4	0.0	10.9	0.0	4.4	4.0	0.0	4.2	3.7
LnGrp LOS				B		B		A	A		A	A
Approach Vol, veh/h					298			856			677	
Approach Delay, s/veh					12.2			4.3			4.1	
Approach LOS					B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		20.7				20.7		9.2
Change Period (Y+Rc), s		5.3				5.3		4.6
Max Green Setting (Gmax), s		28.7				28.7		11.4
Max Q Clear Time (g_c+I1), s		5.1				4.5		4.1
Green Ext Time (p_c), s		10.1				10.2		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	5.5
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	350	0	940	0	0	0	0	700	490	0	470	230
Future Volume (veh/h)	350	0	940	0	0	0	0	700	490	0	470	230
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776				0	1776	1776	0	1776	1776
Adj Flow Rate, veh/h	380	0	623				0	761	0	0	511	0
Adj No. of Lanes	2	0	3				0	3	1	0	2	1
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7				0	7	7	0	7	7
Cap, veh/h	952	0	1274				0	2015	627	0	1402	627
Arrive On Green	0.28	0.00	0.28				0.00	0.42	0.00	0.00	0.42	0.00
Sat Flow, veh/h	3382	0	4528				0	5007	1509	0	3463	1509
Grp Volume(v), veh/h	380	0	623				0	761	0	0	511	0
Grp Sat Flow(s),veh/h/ln	1691	0	1509				0	1616	1509	0	1687	1509
Q Serve(g_s), s	3.0	0.0	3.7				0.0	3.6	0.0	0.0	3.4	0.0
Cycle Q Clear(g_c), s	3.0	0.0	3.7				0.0	3.6	0.0	0.0	3.4	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	952	0	1274				0	2015	627	0	1402	627
V/C Ratio(X)	0.40	0.00	0.49				0.00	0.38	0.00	0.00	0.36	0.00
Avail Cap(c_a), veh/h	1802	0	2412				0	3369	1049	0	2344	1049
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	9.5	0.0	9.8				0.0	6.6	0.0	0.0	6.6	0.0
Incr Delay (d2), s/veh	0.3	0.0	0.3				0.0	0.1	0.0	0.0	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	1.6				0.0	1.6	0.0	0.0	1.6	0.0
LnGrp Delay(d),s/veh	9.8	0.0	10.1				0.0	6.7	0.0	0.0	6.7	0.0
LnGrp LOS	A		B					A			A	
Approach Vol, veh/h		1003						761			511	
Approach Delay, s/veh		10.0						6.7			6.7	
Approach LOS		A						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		18.9		13.8		18.9		
Change Period (Y+Rc), s		5.3		4.6		5.3		
Max Green Setting (Gmax), s		22.7		17.4		22.7		
Max Q Clear Time (g_c+I1), s		5.6		5.7		5.4		
Green Ext Time (p_c), s		8.0		3.4		8.0		

Intersection Summary	
HCM 2010 Ctrl Delay	8.2
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

APPENDIX 3.13-6:
TECHNICAL CALCULATIONS –
CUMULATIVE NO PROJECT CONDITIONS
FREEWAY LOS

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	11/29/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	Eastbound SR 120
From/To:	Yosemite ON to McKinley OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	3930	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1092	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1543	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1543	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	3	
Density, D	23.8	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/29/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	Eastbound SR 120
Junction:	McKinley Avenue Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3930	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	470	vph
Length of first accel/decel lane	144	ft
Length of second accel/decel lane	369	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	290	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2422	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3930	470	290	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1092	131	81	v
Trucks and buses	12	7	11	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4629	540	340	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.450 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2380 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4629	7050	No
$v_{FO} = v_F - v_R$	4089	7050	No
v_R	540	4200	No
v_3 or v_{av34}	2249 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	Yes	

If yes, v_{12A} = 2645 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2645	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 21.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.347

Space mean speed in ramp influence area, S_R = 57.0 mph

Space mean speed in outer lanes, S_0 = 67.5 mph

Space mean speed for all vehicles, S = 61.1 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/29/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	McKinley Ave Loop On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3460	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	25.0	mph
Volume on ramp	130	vph
Length of first accel/decel lane	280	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	210	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	1043	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3460	130	210	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	961	36	58	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4075	149	241	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.585 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 2385 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4224	7050	No
v_3 or v_{av34}	1690 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2385 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4224	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 23.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.356	
Space mean speed in ramp influence area,	S_R = 56.8	mph
Space mean speed in outer lanes,	S_0 = 60.7	mph
Space mean speed for all vehicles,	S = 58.3	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/29/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	McKinley Ave Slip On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3590	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	210	vph
Length of first accel/decel lane	260	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	610	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1842	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3590	210	610	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	997	58	169	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4228	241	701	pcph

Estimation of V12 Merge Areas

L_{EQ} = 5101.15 (Equation 13-6 or 13-7)

P_{FM} = 0.649 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 2743 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4469	7050	No
v_3 or v_{av34}	1485 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2743 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4469	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 27.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.375

Space mean speed in ramp influence area, S_R = 56.4 mph

Space mean speed in outer lanes, S_0 = 61.5 mph

Space mean speed for all vehicles, S = 58.0 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	11/29/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	Eastbound SR 120
From/To:	McKinley SlipON to Airport OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	3800	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1056	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1492	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1492	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	3	
Density, D	23.0	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/29/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	Eastbound SR 120
Junction:	Airport Way Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3800	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	610	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	210	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1842	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3800	610	210	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1056	169	58	v
Trucks and buses	12	7	11	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4476	701	246	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 2038.58 (Equation 13-12 or 13-13)

P_{FD} = 0.623 Using Equation 6

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3053 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4476	7050	No
$v_{FO} = v_F - v_R$	3775	7050	No
v_R	701	2100	No
v_3 or v_{av34}	1423 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3053 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3053	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 28.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.361

Space mean speed in ramp influence area, S_R = 56.7 mph

Space mean speed in outer lanes, S_0 = 69.7 mph

Space mean speed for all vehicles, S = 60.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.2

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/29/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Airport Way On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3190	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	810	vph
Length of first accel/decel lane	415	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	580	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2060	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3190	810	580	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	886	225	161	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3757	931	667	pcph

Estimation of V12 Merge Areas

L_{EQ} = 4331.03 (Equation 13-6 or 13-7)

P_{FM} = 0.634 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 2381 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4688	7050	No
v_3 or v_{av34}	1376 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2381 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4688	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 28.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.391	
Space mean speed in ramp influence area,	S_R = 56.0	mph
Space mean speed in outer lanes,	S_0 = 61.8	mph
Space mean speed for all vehicles,	S = 57.6	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	11/29/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	SR 120 Eastbound
From/To:	Airport ON to Union OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	4000	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1111	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1570	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1570	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.6	mi/h
Number of lanes, N	3	
Density, D	24.3	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Freeway Merge and Diverge Segments Release 6.2

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/29/2106
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Union Rd Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4000	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	580	vph
Length of first accel/decel lane	245	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	810	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2060	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4000	580	810	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1111	161	225	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4711	667	931	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 7236.07 (Equation 13-12 or 13-13)

P_{FD} = 0.806 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3927 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4711	7050	No
$v_{FO} = v - v_F - v_R$	4044	7050	No
v_R	667	2100	No
v_3 or v_{av34}	784 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3927 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3927	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 35.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.358

Space mean speed in ramp influence area, S_R = 56.8 mph

Space mean speed in outer lanes, S_0 = 71.3 mph

Space mean speed for all vehicles, S = 58.8 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/29/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Union Rd On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3420	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	610	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	790	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3420	610	790	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	950	169	219	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4028	701	908	pcph

Estimation of V12 Merge Areas

L_{EQ} = 5390.32 (Equation 13-6 or 13-7)

P_{FM} = 0.668 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 2691 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4729	7050	No
v_3 or v_{av34}	1337 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2691 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4729	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 28.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.387	
Space mean speed in ramp influence area,	S_R = 56.1	mph
Space mean speed in outer lanes,	S_0 = 62.0	mph
Space mean speed for all vehicles,	S = 57.6	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	11/30/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	Eastbound SR 120
From/To:	Yosemite ON to McKinley OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	6320	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1756	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2481	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2481	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	48.4	mi/h
Number of lanes, N	3	
Density, D	51.2	pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	Eastbound SR 120
Junction:	McKinley Ave Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6320	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1290	vph
Length of first accel/decel lane	144	ft
Length of second accel/decel lane	369	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1060	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2422	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6320	1290	1060	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1756	358	294	v
Trucks and buses	12	4	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7444	1462	1231	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.450 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4154 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7444	7050	Yes
$v_{FO} = v_F - v_R$	5982	7050	No
v_R	1462	4200	No
v_3 or v_{av34}	3290 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	Yes	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 4744 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4744	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 39.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.430

Space mean speed in ramp influence area, S_R = 55.1 mph

Space mean speed in outer lanes, S_0 = 64.7 mph

Space mean speed for all vehicles, S = 58.2 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	McKinley Ave Loop On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5030	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	25.0	mph
Volume on ramp	230	vph
Length of first accel/decel lane	280	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	490	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	1043	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5030	230	490	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1397	64	136	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5924	261	555	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.585 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 3468 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6185	7050	No
v_3 or v_{av34}	2456 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3468 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6185	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 32.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.469	
Space mean speed in ramp influence area,	S_R = 54.2	mph
Space mean speed in outer lanes,	S_0 = 57.5	mph
Space mean speed for all vehicles,	S = 55.5	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	McKinley Ave Slip On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5260	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	490	vph
Length of first accel/decel lane	260	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1120	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1842	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5260	490	1120	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1461	136	311	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6195	555	1269	pcph

Estimation of V12 Merge Areas

L_{EQ} = 9234.46 (Equation 13-6 or 13-7)

P_{FM} = 0.730 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 4521 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6750	7050	No
v_3 or v_{av34}	1674 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 4521 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6750	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 43.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.922	
Space mean speed in ramp influence area,	S_R = 43.8	mph
Space mean speed in outer lanes,	S_0 = 60.8	mph
Space mean speed for all vehicles,	S = 47.1	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	11/30/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	Eastbound SR 120
From/To:	McKinley SlipON to Airport OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	5750	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1597	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2257	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2257	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	54.6	mi/h
Number of lanes, N	3	
Density, D	41.3	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	Eastbound SR 120
Junction:	Airport Way Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5750	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1120	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	490	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1842	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5750	1120	490	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1597	311	136	v
Trucks and buses	12	4	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6772	1269	569	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 4366.44 (Equation 13-12 or 13-13)

P_{FD} = 0.639 Using Equation 6

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4788 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6772	7050	No
$v_{FO} = v_F - v_R$	5503	7050	No
v_R	1269	2100	No
v_3 or v_{av34}	1984 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 4788 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4788	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 43.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.412

Space mean speed in ramp influence area, S_R = 55.5 mph

Space mean speed in outer lanes, S_0 = 67.5 mph

Space mean speed for all vehicles, S = 58.6 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Airport Way On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4630	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	1110	vph
Length of first accel/decel lane	415	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1240	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2060	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4630	1110	1240	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1286	308	344	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5453	1258	1405	pcph

Estimation of V12 Merge Areas

L_{EQ} = 9123.08 (Equation 13-6 or 13-7)

P_{FM} = 0.728 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 3969 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6711	7050	No
v_3 or v_{av34}	1484 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3969 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6711	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 43.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 1.010	
Space mean speed in ramp influence area,	S_R = 41.8	mph
Space mean speed in outer lanes,	S_0 = 61.5	mph
Space mean speed for all vehicles,	S = 45.0	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	11/30/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR 120 Eastbound
From/To:	Airport ON to Union OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	5740	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1594	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2253	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2253	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	54.7	mi/h
Number of lanes, N	3	
Density, D	41.2	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Union Rd Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5740	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1240	vph
Length of first accel/decel lane	245	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1110	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2060	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5740	1240	1110	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1594	344	308	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6760	1405	1258	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 10509.61 Equation 13-12 or 13-13)

P_{FD} = 0.822 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 5808 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6760	7050	No
$v_{FO} = v - v_R$	5355	7050	No
v_R	1405	2100	No
v_3 or v_{av34}	952 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 5808 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5808	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 52.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	D_S = 0.424	
Space mean speed in ramp influence area,	S_R = 55.2	mph
Space mean speed in outer lanes,	S_0 = 71.3	mph
Space mean speed for all vehicles,	S = 57.0	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Union Rd On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4500	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	720	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1470	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4500	720	1470	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1250	200	408	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5300	816	1666	pcph

Estimation of V12 Merge Areas

L_{EQ} = 9890.17 (Equation 13-6 or 13-7)

P_{FM} = 0.768 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 4068 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6116	7050	No
v_3 or v_{av34}	1232 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 4068 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6116	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 39.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.787	
Space mean speed in ramp influence area,	S_R = 46.9	mph
Space mean speed in outer lanes,	S_0 = 62.4	mph
Space mean speed for all vehicles,	S = 49.4	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Union Rd Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4980	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	720	vph
Length of first accel/decel lane	180	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	630	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2110	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4980	720	630	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1383	200	175	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5865	828	724	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 5064.11 (Equation 13-12 or 13-13)

P_{FD} = 0.696 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4331 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5865	7050	No
$v_{FO} = v - v_{FR}$	5037	7050	No
v_R	828	2100	No
v_3 or v_{av34}	1534 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 4331 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4331	4400	No

Level of Service Determination (if not F)

Density, $D_D = 4.252 + 0.0086\, v_R - 0.009\, L$ = 39.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.373

Space mean speed in ramp influence area, S_R = 56.4 mph

Space mean speed in outer lanes, S_0 = 69.2 mph

Space mean speed for all vehicles, S = 59.3 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Union Rd On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4260	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	1140	vph
Length of first accel/decel lane	480	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1020	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2120	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4260	1140	1020	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1183	317	283	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5017	1311	1173	pcph

Estimation of V12 Merge Areas

L_{EQ} = 7287.52 (Equation 13-6 or 13-7)

P_{FM} = 0.694 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 3482 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6328	7050	No
v_3 or v_{av34}	1535 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3482 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6328	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 39.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.748	
Space mean speed in ramp influence area,	S_R = 47.8	mph
Space mean speed in outer lanes,	S_0 = 61.3	mph
Space mean speed for all vehicles,	S = 50.5	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	11/30/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	SR 120 Westbound
From/To:	Union ON to Airport OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	5400	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1500	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2120	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2120	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	57.6	mi/h
Number of lanes, N	3	
Density, D	36.8	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Airport Way Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5400	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1020	vph
Length of first accel/decel lane	185	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1140	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2120	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5400	1020	1140	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1500	283	317	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6360	1173	1311	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 10231.64 Equation 13-12 or 13-13)

P_{FD} = 0.842 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 5543 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6360	7050	No
$v_{FO} = v - v_{FR}$	5187	7050	No
v_R	1173	2100	No
v_3 or v_{av34}	817 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 5543 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5543	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 50.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.404

Space mean speed in ramp influence area, S_R = 55.7 mph

Space mean speed in outer lanes, S_0 = 71.3 mph

Space mean speed for all vehicles, S = 57.3 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	Westbound SR 120
Junction:	Airport Way On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4380	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	660	vph
Length of first accel/decel lane	512	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	450	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1981	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4380	660	450	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1217	183	125	v
Trucks and buses	12	7	11	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5159	759	528	pcph

Estimation of V12 Merge Areas

L_{EQ} = 3211.99 (Equation 13-6 or 13-7)

P_{FM} = 0.619 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 3192 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5918	7050	No
v_3 or v_{av34}	1967 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3192 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5918	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 32.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.478	
Space mean speed in ramp influence area,	S_R = 54.0	mph
Space mean speed in outer lanes,	S_0 = 59.7	mph
Space mean speed for all vehicles,	S = 55.8	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	11/30/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	Westbound SR 120
From/To:	Airport ON to McKinley OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	5040	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1400	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1979	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1979	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	60.2	mi/h
Number of lanes, N	3	
Density, D	32.8	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	McKinley Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5040	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	450	vph
Length of first accel/decel lane	143	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	660	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1981	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5040	450	660	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1400	125	183	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5936	517	759	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 4511.52 (Equation 13-12 or 13-13)

P_{FD} = 0.717 Using Equation 6

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4402 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5936	7050	No
$v_{FO} = v_F - v_R$	5419	7050	No
v_R	517	2100	No
v_3 or v_{av34}	1534 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 4402 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4402	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 40.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.345

Space mean speed in ramp influence area, S_R = 57.1 mph

Space mean speed in outer lanes, S_0 = 69.2 mph

Space mean speed for all vehicles, S = 59.8 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	Westbound SR 120
Junction:	McKinley Ave Loop On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4590	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	25.0	mph
Volume on ramp	740	vph
Length of first accel/decel lane	603	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	370	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	897	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4590	740	370	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1275	206	103	v
Trucks and buses	12	7	11	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5406	851	434	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.594 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 3213 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6257	7050	No
v_3 or v_{av34}	2193 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3213 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6257	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 33.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.518	
Space mean speed in ramp influence area,	S_R = 53.1	mph
Space mean speed in outer lanes,	S_0 = 58.9	mph
Space mean speed for all vehicles,	S = 55.0	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	Westbound SR 120
Junction:	McKinley Ave Slip On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5330	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	370	vph
Length of first accel/decel lane	285	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	970	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2312	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5330	370	970	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1481	103	269	v
Trucks and buses	12	7	11	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6278	425	1137	pcph

Estimation of V12 Merge Areas

L_{EQ} = 8115.92 (Equation 13-6 or 13-7)

P_{FM} = 0.678 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 4256 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6703	7050	No
v_3 or v_{av34}	2022 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 4256 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6703	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 40.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.716	
Space mean speed in ramp influence area,	S_R = 48.5	mph
Space mean speed in outer lanes,	S_0 = 59.5	mph
Space mean speed for all vehicles,	S = 51.4	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	11/30/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	Westbound SR 120
From/To:	McKinley SlipON to YosemiteOFF
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	5700	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1583	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2238	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2238	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	3	
Density, D	40.7	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Union Rd Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5040	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	830	vph
Length of first accel/decel lane	180	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1030	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2110	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5040	830	1030	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1400	231	286	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5936	941	1167	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 8580.13 (Equation 13-12 or 13-13)

P_{FD} = 0.820 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 5035 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5936	7050	No
$v_{FO} = v - v_R$	4995	7050	No
v_R	941	2100	No
v_3 or v_{av34}	901 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 5035 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5035	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 45.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	D_S = 0.383	
Space mean speed in ramp influence area,	S_R = 56.2	mph
Space mean speed in outer lanes,	S_0 = 71.3	mph
Space mean speed for all vehicles,	S = 58.1	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Union Rd On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4210	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	850	vph
Length of first accel/decel lane	480	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1200	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2120	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4210	850	1200	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1169	236	333	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4958	963	1360	pcph

Estimation of V12 Merge Areas

L_{EQ} = 8449.30 (Equation 13-6 or 13-7)

P_{FM} = 0.717 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 3556 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5921	7050	No
v_3 or v_{av34}	1402 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3556 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5921	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 37.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.636	
Space mean speed in ramp influence area,	S_R = 50.4	mph
Space mean speed in outer lanes,	S_0 = 61.8	mph
Space mean speed for all vehicles,	S = 52.7	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR 120 Westbound
From/To:	Union ON to Airport OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	5060	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1406	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1987	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1987	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	60.1	mi/h
Number of lanes, N	3	
Density, D	33.1	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Airport Way Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5060	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1200	vph
Length of first accel/decel lane	185	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	850	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2120	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5060	1200	850	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1406	333	236	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5960	1360	963	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 9195.95 (Equation 13-12 or 13-13)

P_{FD} = 0.759 Using Equation 6

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4851 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5960	7050	No
$v_{FO} = v_F - v_R$	4600	7050	No
v_R	1360	2100	No
v_3 or v_{av34}	1109 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 4851 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4851	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 44.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.420

Space mean speed in ramp influence area, S_R = 55.3 mph

Space mean speed in outer lanes, S_0 = 70.9 mph

Space mean speed for all vehicles, S = 57.7 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	Westbound SR 120
Junction:	Airport Way On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3860	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	850	vph
Length of first accel/decel lane	512	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	450	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1981	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3860	850	450	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1072	236	125	v
Trucks and buses	12	4	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4546	963	523	pcph

Estimation of V12 Merge Areas

L_{EQ} = 3181.57 (Equation 13-6 or 13-7)

P_{FM} = 0.618 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 2810 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5509	7050	No
v_3 or v_{av34}	1736 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2810 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5509	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 31.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.445	
Space mean speed in ramp influence area,	S_R = 54.8	mph
Space mean speed in outer lanes,	S_0 = 60.6	mph
Space mean speed for all vehicles,	S = 56.5	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	11/30/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR 120 Westbound
From/To:	Airport ON to McKinley OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	4710	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1308	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1849	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1849	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.1	mi/h
Number of lanes, N	3	
Density, D	29.8	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	McKinley Ave Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4710	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	450	vph
Length of first accel/decel lane	143	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	850	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1981	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4710	450	850	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1308	125	236	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5547	510	963	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 6025.49 (Equation 13-12 or 13-13)

P_{FD} = 0.794 Using Equation 6

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4511 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5547	7050	No
$v_{FO} = v_F - v_R$	5037	7050	No
v_R	510	2100	No
v_3 or v_{av34}	1036 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 4511 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4511	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 41.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.344

Space mean speed in ramp influence area, S_R = 57.1 mph

Space mean speed in outer lanes, S_0 = 71.2 mph

Space mean speed for all vehicles, S = 59.3 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	Westbound SR 120
Junction:	McKinley Ave Loop On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4260	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	25.0	mph
Volume on ramp	500	vph
Length of first accel/decel lane	603	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	340	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	897	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4260	500	340	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1183	139	94	v
Trucks and buses	12	4	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5017	567	395	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.594 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 2982 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5584	7050	No

v_3 or v_{av34} 2035 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2982 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5584	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 29.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.426	
Space mean speed in ramp influence area,	S_R = 55.2	mph
Space mean speed in outer lanes,	S_0 = 59.5	mph
Space mean speed for all vehicles,	S = 56.7	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	11/30/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	Westbound SR 120
Junction:	McKinley Ave Slip On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4760	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	340	vph
Length of first accel/decel lane	285	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	430	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2312	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4760	340	430	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1322	94	119	v
Trucks and buses	12	4	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5606	385	499	pcph

Estimation of V12 Merge Areas

L_{EQ} = 3561.87 (Equation 13-6 or 13-7)

P_{FM} = 0.605 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 3394 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5991	7050	No
v_3 or v_{av34}	2212 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3394 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5991	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 33.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.466	
Space mean speed in ramp influence area,	S_R = 54.3	mph
Space mean speed in outer lanes,	S_0 = 58.8	mph
Space mean speed for all vehicles,	S = 55.9	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	11/30/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	Westbound SR 120
From/To:	McKinley SlipON to YosemiteOFF
Jurisdiction:	District 10
Analysis Year:	Cumulative No Project
Description:	Oakwood Landing

Flow Inputs and Adjustments

Volume, V	5100	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1417	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2002	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2002	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	59.9	mi/h
Number of lanes, N	3	
Density, D	33.4	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

APPENDIX 3.13-7:
TECHNICAL CALCULATIONS –
CUMULATIVE PLUS PROJECT CONDITIONS
INTERSECTION LOS

Intersection	
Intersection Delay, s/veh	28.4
Intersection LOS	D

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	50	160	30	0	116	200	190	0	70	127	161
Future Vol, veh/h	0	50	160	30	0	116	200	190	0	70	127	161
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	0	54	174	33	0	126	217	207	0	76	138	175
Number of Lanes	0	1	1	0	0	1	1	1	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	3	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	3
HCM Control Delay	21.5	17.5	46.6
HCM LOS	C	C	E

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1
Vol Left, %	20%	100%	0%	100%	0%	0%	44%
Vol Thru, %	35%	0%	84%	0%	100%	0%	41%
Vol Right, %	45%	0%	16%	0%	0%	100%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	358	50	190	116	200	190	273
LT Vol	70	50	0	116	0	0	120
Through Vol	127	0	160	0	200	0	113
RT Vol	161	0	30	0	0	190	40
Lane Flow Rate	389	54	207	126	217	207	297
Geometry Grp	7	8	8	7	7	7	7
Degree of Util (X)	0.878	0.153	0.545	0.313	0.508	0.441	0.718
Departure Headway (Hd)	8.123	10.146	9.502	8.939	8.419	7.69	8.714
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	448	353	378	402	428	467	415
Service Time	5.88	7.925	7.28	6.705	6.185	5.456	6.477
HCM Lane V/C Ratio	0.868	0.153	0.548	0.313	0.507	0.443	0.716
HCM Control Delay	46.6	14.8	23.2	15.8	19.6	16.4	30.9
HCM Lane LOS	E	B	C	C	C	C	D
HCM 95th-tile Q	9.1	0.5	3.1	1.3	2.8	2.2	5.5

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	120	113	40
Future Vol, veh/h	0	120	113	40
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	7	7	7	7
Mvmt Flow	0	130	123	43
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	3
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	30.9
HCM LOS	D

Lane

Intersection	
Intersection Delay, s/veh	63.9
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	179	180	0	0	44	78	426	0	4	352	156	0	78	86	61
Future Vol, veh/h	0	179	180	0	0	44	78	426	0	4	352	156	0	78	86	61
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	7	0	2	7	7	7	5	0	7	7	7	7	7	0	7	5
Mvmt Flow	0	195	196	0	0	48	85	463	0	4	383	170	0	85	93	66
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	61.4	71.9	73.2	27.2
HCM LOS	F	F	F	D

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	1%	50%	8%	35%
Vol Thru, %	69%	50%	14%	38%
Vol Right, %	30%	0%	78%	27%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	512	359	548	225
LT Vol	4	179	44	78
Through Vol	352	180	78	86
RT Vol	156	0	426	61
Lane Flow Rate	557	390	596	245
Geometry Grp	1	1	1	1
Degree of Util (X)	1	0.944	1	0.633
Departure Headway (Hd)	8.399	8.707	8.13	9.315
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	434	418	447	389
Service Time	6.47	6.743	6.2	7.359
HCM Lane V/C Ratio	1.283	0.933	1.333	0.63
HCM Control Delay	73.2	61.4	71.9	27.2
HCM Lane LOS	F	F	F	D
HCM 95th-tile Q	12.6	10.7	12.8	4.2



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	120	240	30	80	265	210	220	523	230	320	390	251
Future Volume (veh/h)	120	240	30	80	265	210	220	523	230	320	390	251
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1712	1877	1900	1827	1857	1900	1845	1827	1863	1827	1792	1845
Adj Flow Rate, veh/h	130	261	24	87	288	89	239	568	160	348	424	88
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	11	0	0	4	1	1	3	4	2	4	6	3
Cap, veh/h	170	666	61	137	467	141	293	619	527	397	717	618
Arrive On Green	0.10	0.20	0.19	0.08	0.18	0.16	0.17	0.34	0.34	0.23	0.40	0.40
Sat Flow, veh/h	1630	3294	300	1740	2650	800	1757	1827	1554	1740	1792	1545
Grp Volume(v), veh/h	130	140	145	87	189	188	239	568	160	348	424	88
Grp Sat Flow(s),veh/h/ln	1630	1783	1811	1740	1764	1686	1757	1827	1554	1740	1792	1545
Q Serve(g_s), s	8.2	7.2	7.3	5.1	10.4	10.9	13.8	31.4	8.0	20.3	19.6	3.8
Cycle Q Clear(g_c), s	8.2	7.2	7.3	5.1	10.4	10.9	13.8	31.4	8.0	20.3	19.6	3.8
Prop In Lane	1.00		0.17	1.00		0.47	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	170	360	366	137	311	297	293	619	527	397	717	618
V/C Ratio(X)	0.76	0.39	0.40	0.63	0.61	0.63	0.81	0.92	0.30	0.88	0.59	0.14
Avail Cap(c_a), veh/h	170	457	465	210	481	460	467	647	551	446	717	618
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.9	36.4	36.5	47.0	40.0	40.6	42.3	33.4	25.6	39.2	24.8	20.1
Incr Delay (d2), s/veh	18.3	0.7	0.7	4.8	1.9	2.2	5.9	17.6	0.3	16.4	1.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.5	3.6	3.7	2.6	5.3	5.3	7.2	18.8	3.4	11.6	9.9	1.6
LnGrp Delay(d),s/veh	64.1	37.0	37.2	51.8	41.9	42.8	48.2	51.0	25.9	55.6	26.1	20.2
LnGrp LOS	E	D	D	D	D	D	D	D	C	E	C	C
Approach Vol, veh/h		415			464			967			860	
Approach Delay, s/veh		45.6			44.1			46.1			37.4	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	28.0	39.7	12.3	25.3	21.6	46.1	15.0	22.6
Change Period (Y+Rc), s	5.3	5.3	5.7	5.7	5.3	5.3	5.7	5.7
Max Green Setting (Gmax), s	25.7	36.0	11.0	25.3	26.7	35.0	9.3	27.0
Max Q Clear Time (g_c+I1), s	22.3	33.4	7.1	9.3	15.8	21.6	10.2	12.9
Green Ext Time (p_c), s	0.4	1.0	0.1	3.2	0.5	5.9	0.0	3.0

Intersection Summary	
HCM 2010 Ctrl Delay	42.9
HCM 2010 LOS	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	30	309	315	40	60	583	888	320	80	472	60
Future Volume (veh/h)	110	30	309	315	40	60	583	888	320	80	472	60
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776
Adj Flow Rate, veh/h	120	33	18	342	43	10	634	965	134	87	513	14
Adj No. of Lanes	2	1	1	2	1	1	2	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	196	143	116	448	280	231	761	1580	689	110	1016	447
Arrive On Green	0.06	0.08	0.08	0.14	0.16	0.16	0.23	0.47	0.47	0.06	0.30	0.30
Sat Flow, veh/h	3281	1776	1442	3281	1776	1466	3281	3374	1471	1691	3374	1484
Grp Volume(v), veh/h	120	33	18	342	43	10	634	965	134	87	513	14
Grp Sat Flow(s),veh/h/ln	1640	1776	1442	1640	1776	1466	1640	1687	1471	1691	1687	1484
Q Serve(g_s), s	2.3	1.1	0.7	6.4	1.3	0.4	11.8	13.7	3.4	3.2	8.0	0.4
Cycle Q Clear(g_c), s	2.3	1.1	0.7	6.4	1.3	0.4	11.8	13.7	3.4	3.2	8.0	0.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	196	143	116	448	280	231	761	1580	689	110	1016	447
V/C Ratio(X)	0.61	0.23	0.15	0.76	0.15	0.04	0.83	0.61	0.19	0.79	0.50	0.03
Avail Cap(c_a), veh/h	307	443	360	563	582	480	922	1580	689	185	1016	447
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.4	27.6	27.4	26.7	23.3	22.9	23.4	12.7	10.0	29.5	18.5	15.8
Incr Delay (d2), s/veh	3.1	0.8	0.6	4.8	0.3	0.1	5.6	1.8	0.6	12.1	1.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.6	0.3	3.2	0.7	0.2	5.9	6.7	1.5	1.9	4.0	0.2
LnGrp Delay(d),s/veh	32.5	28.4	28.0	31.4	23.6	23.0	29.1	14.5	10.6	41.6	20.2	15.9
LnGrp LOS	C	C	C	C	C	C	C	B	B	D	C	B
Approach Vol, veh/h		171			395			1733			614	
Approach Delay, s/veh		31.2			30.4			19.5			23.2	
Approach LOS		C			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.2	34.0	12.8	9.2	18.9	23.3	7.8	14.1
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	7.0	30.0	11.0	16.0	18.0	19.0	6.0	21.0
Max Q Clear Time (g_c+I1), s	5.3	15.7	8.4	3.1	13.8	10.0	4.3	3.3
Green Ext Time (p_c), s	0.0	9.0	0.3	0.3	1.1	6.3	0.0	0.4

Intersection Summary		
HCM 2010 Ctrl Delay		22.4
HCM 2010 LOS		C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	250	0	780	286	1011	0	0	656	440
Future Volume (veh/h)	0	0	0	250	0	780	286	1011	0	0	656	440
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1776	1776	1776	1776	0	0	1776	1776
Adj Flow Rate, veh/h				272	0	809	311	1099	0	0	713	271
Adj No. of Lanes				0	1	1	1	1	0	0	1	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				7	7	7	7	7	0	0	7	7
Cap, veh/h				725	0	647	197	913	0	0	672	559
Arrive On Green				0.43	0.00	0.43	0.12	0.51	0.00	0.00	0.38	0.38
Sat Flow, veh/h				1691	0	1509	1691	1776	0	0	1776	1476
Grp Volume(v), veh/h				272	0	809	311	1099	0	0	713	271
Grp Sat Flow(s),veh/h/ln				1691	0	1509	1691	1776	0	0	1776	1476
Q Serve(g_s), s				15.3	0.0	60.0	16.3	72.0	0.0	0.0	53.0	19.6
Cycle Q Clear(g_c), s				15.3	0.0	60.0	16.3	72.0	0.0	0.0	53.0	19.6
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				725	0	647	197	913	0	0	672	559
V/C Ratio(X)				0.38	0.00	1.25	1.58	1.20	0.00	0.00	1.06	0.48
Avail Cap(c_a), veh/h				725	0	647	197	913	0	0	672	559
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				27.2	0.0	40.0	61.8	34.0	0.0	0.0	43.5	33.1
Incr Delay (d2), s/veh				0.4	0.0	125.3	283.7	102.0	0.0	0.0	51.9	0.8
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				7.3	0.0	47.5	23.1	60.9	0.0	0.0	35.6	8.1
LnGrp Delay(d),s/veh				27.6	0.0	165.3	345.5	136.0	0.0	0.0	95.4	33.9
LnGrp LOS				C		F	F	F			F	C
Approach Vol, veh/h					1081			1410			984	
Approach Delay, s/veh					130.7			182.2			78.5	
Approach LOS					F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		76.0			19.0	57.0		64.0
Change Period (Y+Rc), s		5.3			4.0	5.3		4.6
Max Green Setting (Gmax), s		70.7			15.0	51.7		59.4
Max Q Clear Time (g_c+I1), s		74.0			18.3	55.0		62.0
Green Ext Time (p_c), s		0.0			0.0	0.0		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		136.8
HCM 2010 LOS		F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	370	0	268	0	0	0	0	927	574	270	636	0
Future Volume (veh/h)	370	0	268	0	0	0	0	927	574	270	636	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1776	1776				0	1776	1776	1776	1776	0
Adj Flow Rate, veh/h	402	0	50				0	1008	461	293	691	0
Adj No. of Lanes	0	1	1				0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7				0	7	7	7	7	0
Cap, veh/h	400	0	357				0	856	712	292	1227	0
Arrive On Green	0.24	0.00	0.24				0.00	0.48	0.48	0.17	0.69	0.00
Sat Flow, veh/h	1691	0	1509				0	1776	1477	1691	1776	0
Grp Volume(v), veh/h	402	0	50				0	1008	461	293	691	0
Grp Sat Flow(s),veh/h/ln	1691	0	1509				0	1776	1477	1691	1776	0
Q Serve(g_s), s	26.0	0.0	2.9				0.0	53.0	25.9	19.0	21.7	0.0
Cycle Q Clear(g_c), s	26.0	0.0	2.9				0.0	53.0	25.9	19.0	21.7	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	400	0	357				0	856	712	292	1227	0
V/C Ratio(X)	1.01	0.00	0.14				0.00	1.18	0.65	1.00	0.56	0.00
Avail Cap(c_a), veh/h	400	0	357				0	856	712	292	1227	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	42.0	0.0	33.2				0.0	28.5	21.5	45.5	8.6	0.0
Incr Delay (d2), s/veh	46.4	0.0	0.2				0.0	92.3	2.0	53.4	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.3	0.0	1.2				0.0	47.8	10.9	13.2	10.7	0.0
LnGrp Delay(d),s/veh	88.5	0.0	33.4				0.0	120.8	23.5	98.9	9.2	0.0
LnGrp LOS	F		C					F	C	F	A	
Approach Vol, veh/h		452						1469			984	
Approach Delay, s/veh		82.4						90.2			35.9	
Approach LOS		F						F			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	23.0	57.0		30.0		80.0		
Change Period (Y+Rc), s	4.0	5.3		4.6		5.3		
Max Green Setting (Gmax), s	19.0	51.7		25.4		74.7		
Max Q Clear Time (g_c+I1), s	21.0	55.0		28.0		23.7		
Green Ext Time (p_c), s	0.0	0.0		0.0		14.8		

Intersection Summary	
HCM 2010 Ctrl Delay	70.6
HCM 2010 LOS	E

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	331	26	73	20	37	400	5	770	30	360	350	194
Future Vol, veh/h	331	26	73	20	37	400	5	770	30	360	350	194
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	340	-	0	0	-	0	175	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	360	28	79	22	40	435	5	837	33	391	380	211

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2031	2011	382	2025	2011	839	380	0	0	837	0	0
Stage 1	1163	1163	-	848	848	-	-	-	-	-	-	-
Stage 2	868	848	-	1177	1163	-	-	-	-	-	-	-
Critical Hdwy	7.17	6.57	6.27	7.17	6.57	6.27	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.17	5.57	-	6.17	5.57	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.17	5.57	-	6.17	5.57	-	-	-	-	-	-	-
Follow-up Hdwy	3.563	4.063	3.363	3.563	4.063	3.363	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 41	57	654	41	57	~ 358	1152	-	-	776	-	-
Stage 1	~ 232	263	-	349	371	-	-	-	-	-	-	-
Stage 2	~ 340	371	-	228	263	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 28	653	-	~ 28	~ 357	1150	-	-	775	-	-
Mov Cap-2 Maneuver	-	~ 28	-	-	~ 28	-	-	-	-	-	-	-
Stage 1	~ 231	130	-	347	369	-	-	-	-	-	-	-
Stage 2	-	369	-	78	130	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0.1	5.7
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBL	SBT	SBR
Capacity (veh/h)	1150	-	-	-	653	-	28	357	775	-	-
HCM Lane V/C Ratio	0.005	-	-	-	0.122	-	1.436	1.218	0.505	-	-
HCM Control Delay (s)	8.1	-	-	-	11.3	-	$ 536.3	153.2	14.3	-	-
HCM Lane LOS	A	-	-	-	B	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0	-	-	-	0.4	-	4.7	18.5	2.9	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Intersection Delay, s/veh	53.1
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	320	41	70	0	10	87	204	0	70	201	20
Future Vol, veh/h	0	320	41	70	0	10	87	204	0	70	201	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	7	0	5	4	7	0	0	0	7	7	12	0
Mvmt Flow	0	348	45	76	0	11	95	222	0	76	218	22
Number of Lanes	0	0	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	74.1	32.3	37.1
HCM LOS	F	D	E

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	24%	74%	100%	0%	24%
Vol Thru, %	69%	10%	0%	30%	54%
Vol Right, %	7%	16%	0%	70%	21%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	291	431	10	291	373
LT Vol	70	320	10	0	91
Through Vol	201	41	0	87	202
RT Vol	20	70	0	204	80
Lane Flow Rate	316	468	11	316	405
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.779	1	0.029	0.75	0.936
Departure Headway (Hd)	8.862	8.668	9.529	8.535	8.308
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	408	422	375	424	434
Service Time	6.949	6.668	7.312	6.318	6.387
HCM Lane V/C Ratio	0.775	1.109	0.029	0.745	0.933
HCM Control Delay	37.1	74.1	12.6	33	58.1
HCM Lane LOS	E	F	B	D	F
HCM 95th-tile Q	6.6	12.5	0.1	6.1	10.7

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	91	202	80
Future Vol, veh/h	0	91	202	80
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	7	0	4	5
Mvmt Flow	0	99	220	87
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	58.1
HCM LOS	F

Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	270	0	450	590	719	0	0	711	550
Future Volume (veh/h)	0	0	0	270	0	450	590	719	0	0	711	550
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1776	1776	1776	1776	0	0	1776	1776
Adj Flow Rate, veh/h				293	0	221	641	782	0	0	773	360
Adj No. of Lanes				0	1	1	1	1	0	0	1	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				7	7	7	7	7	0	0	7	7
Cap, veh/h				278	0	248	580	1383	0	0	723	600
Arrive On Green				0.16	0.00	0.16	0.34	0.78	0.00	0.00	0.41	0.41
Sat Flow, veh/h				1691	0	1509	1691	1776	0	0	1776	1474
Grp Volume(v), veh/h				293	0	221	641	782	0	0	773	360
Grp Sat Flow(s),veh/h/ln				1691	0	1509	1691	1776	0	0	1776	1474
Q Serve(g_s), s				23.0	0.0	20.1	48.0	24.4	0.0	0.0	57.0	26.8
Cycle Q Clear(g_c), s				23.0	0.0	20.1	48.0	24.4	0.0	0.0	57.0	26.8
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				278	0	248	580	1383	0	0	723	600
V/C Ratio(X)				1.05	0.00	0.89	1.11	0.57	0.00	0.00	1.07	0.60
Avail Cap(c_a), veh/h				278	0	248	580	1383	0	0	723	600
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				58.5	0.0	57.3	46.0	6.1	0.0	0.0	41.5	32.6
Incr Delay (d2), s/veh				69.1	0.0	29.6	69.7	0.3	0.0	0.0	53.5	1.2
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				16.1	0.0	10.4	33.6	11.9	0.0	0.0	38.7	11.1
LnGrp Delay(d),s/veh				127.6	0.0	86.9	115.7	6.5	0.0	0.0	95.0	33.7
LnGrp LOS				F		F	F	A			F	C
Approach Vol, veh/h					514			1423			1133	
Approach Delay, s/veh					110.1			55.7			75.6	
Approach LOS					F			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		113.0			52.0	61.0		27.0
Change Period (Y+Rc), s		4.9			4.0	4.9		4.9
Max Green Setting (Gmax), s		108.1			48.0	56.1		22.1
Max Q Clear Time (g_c+I1), s		26.4			50.0	59.0		25.0
Green Ext Time (p_c), s		0.4			0.0	0.0		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		72.1
HCM 2010 LOS		E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	0	360	0	0	0	0	1089	320	290	691	0
Future Volume (veh/h)	220	0	360	0	0	0	0	1089	320	290	691	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1776	1776				0	1776	1900	1776	1776	0
Adj Flow Rate, veh/h	239	0	62				0	1184	340	315	751	0
Adj No. of Lanes	0	1	1				0	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7				0	7	7	7	7	0
Cap, veh/h	190	0	170				0	883	253	243	1487	0
Arrive On Green	0.11	0.00	0.11				0.00	0.67	0.66	0.14	0.84	0.00
Sat Flow, veh/h	1691	0	1509				0	1320	379	1691	1776	0
Grp Volume(v), veh/h	239	0	62				0	0	1524	315	751	0
Grp Sat Flow(s),veh/h/ln	1691	0	1509				0	0	1699	1691	1776	0
Q Serve(g_s), s	18.0	0.0	6.1				0.0	0.0	107.0	23.0	19.1	0.0
Cycle Q Clear(g_c), s	18.0	0.0	6.1				0.0	0.0	107.0	23.0	19.1	0.0
Prop In Lane	1.00		1.00				0.00		0.22	1.00		0.00
Lane Grp Cap(c), veh/h	190	0	170				0	0	1136	243	1487	0
V/C Ratio(X)	1.26	0.00	0.37				0.00	0.00	1.34	1.30	0.50	0.00
Avail Cap(c_a), veh/h	190	0	170				0	0	1136	243	1487	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	71.5	0.0	65.7				0.0	0.0	26.6	68.5	3.7	0.0
Incr Delay (d2), s/veh	150.8	0.0	0.5				0.0	0.0	159.7	160.1	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.4	0.0	2.6				0.0	0.0	100.3	21.5	9.2	0.0
LnGrp Delay(d),s/veh	222.2	0.0	66.2				0.0	0.0	186.3	228.6	3.8	0.0
LnGrp LOS	F		E						F	F	A	
Approach Vol, veh/h		301						1524			1066	
Approach Delay, s/veh		190.1						186.3			70.2	
Approach LOS		F						F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	27.0	111.0		22.0		138.0		
Change Period (Y+Rc), s	4.0	4.9		4.9		4.9		
Max Green Setting (Gmax), s	23.0	106.1		17.1		133.1		
Max Q Clear Time (g_c+I1), s	25.0	109.0		20.0		21.1		
Green Ext Time (p_c), s	0.0	0.0		0.0		0.5		

Intersection Summary	
HCM 2010 Ctrl Delay	143.9
HCM 2010 LOS	F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	280	20	12	15	30	200	34	902	33	230	372	340
Future Volume (veh/h)	280	20	12	15	30	200	34	902	33	230	372	340
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1900	1776	1776	1776	1776	1776	1776	1776	1776	1900
Adj Flow Rate, veh/h	304	22	2	16	33	0	37	980	18	250	404	257
Adj No. of Lanes	1	1	0	2	1	2	1	1	1	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	326	321	29	97	67	100	46	995	834	300	1231	773
Arrive On Green	0.19	0.20	0.20	0.03	0.04	0.00	0.03	0.56	0.56	0.09	0.62	0.62
Sat Flow, veh/h	1691	1601	146	3281	1776	2656	1691	1776	1488	3281	1972	1239
Grp Volume(v), veh/h	304	0	24	16	33	0	37	980	18	250	345	316
Grp Sat Flow(s),veh/h/ln	1691	0	1747	1640	1776	1328	1691	1776	1488	1640	1687	1523
Q Serve(g_s), s	24.0	0.0	1.5	0.6	2.5	0.0	3.0	73.4	0.7	10.2	13.1	13.3
Cycle Q Clear(g_c), s	24.0	0.0	1.5	0.6	2.5	0.0	3.0	73.4	0.7	10.2	13.1	13.3
Prop In Lane	1.00		0.08	1.00		1.00	1.00		1.00	1.00		0.81
Lane Grp Cap(c), veh/h	326	0	351	97	67	100	46	995	834	300	1053	951
V/C Ratio(X)	0.93	0.00	0.07	0.17	0.49	0.00	0.80	0.98	0.02	0.83	0.33	0.33
Avail Cap(c_a), veh/h	337	0	351	387	209	313	87	995	834	363	1053	951
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.9	0.0	43.9	64.2	64.0	0.0	65.6	29.2	13.3	60.6	12.0	12.1
Incr Delay (d2), s/veh	31.9	0.0	0.1	0.8	5.5	0.0	25.5	25.1	0.0	13.1	0.8	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.1	0.0	0.7	0.3	1.3	0.0	1.7	42.6	0.3	5.2	6.3	5.9
LnGrp Delay(d),s/veh	85.8	0.0	44.0	65.0	69.5	0.0	91.1	54.3	13.3	73.7	12.9	13.0
LnGrp LOS	F		D	E	E		F	D	B	E	B	B
Approach Vol, veh/h		328			49			1035			911	
Approach Delay, s/veh		82.8			68.0			54.9			29.6	
Approach LOS		F			E			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.4	80.0	8.0	31.2	7.7	88.7	30.1	9.1
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	15.0	76.0	16.0	27.0	7.0	84.0	27.0	16.0
Max Q Clear Time (g_c+I1), s	12.2	75.4	2.6	3.5	5.0	15.3	26.0	4.5
Green Ext Time (p_c), s	0.2	0.5	0.0	0.2	0.0	20.3	0.1	0.1

Intersection Summary	
HCM 2010 Ctrl Delay	49.2
HCM 2010 LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Intersection Delay, s/veh	54.1
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	179	161	11	0	20	146	430	0	31	360	20	0	110	160	89
Future Vol, veh/h	0	179	161	11	0	20	146	430	0	31	360	20	0	110	160	89
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	0	195	175	12	0	22	159	467	0	34	391	22	0	120	174	97
Number of Lanes	0	1	1	0	0	1	1	0	0	0	1	0	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	2	2
HCM Control Delay	22	70.9	76.7	31.7
HCM LOS	C	F	F	D

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	8%	100%	0%	100%	0%	41%	0%
Vol Thru, %	88%	0%	94%	0%	25%	59%	0%
Vol Right, %	5%	0%	6%	0%	75%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	411	179	172	20	576	270	89
LT Vol	31	179	0	20	0	110	0
Through Vol	360	0	161	0	146	160	0
RT Vol	20	0	11	0	430	0	89
Lane Flow Rate	447	195	187	22	626	293	97
Geometry Grp	6	7	7	7	7	7	7
Degree of Util (X)	1	0.532	0.483	0.057	1	0.769	0.229
Departure Headway (Hd)	9.244	9.852	9.308	9.493	8.471	9.431	8.529
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	398	366	387	380	432	384	420
Service Time	7.244	7.635	7.091	7.193	6.171	7.208	6.305
HCM Lane V/C Ratio	1.123	0.533	0.483	0.058	1.449	0.763	0.231
HCM Control Delay	76.7	23.4	20.6	12.8	72.9	37.6	13.8
HCM Lane LOS	F	C	C	B	F	E	B
HCM 95th-tile Q	12.1	3	2.5	0.2	12.6	6.3	0.9



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	620	72	32	38	70	96	132	810	52	124	130	738
Future Volume (veh/h)	620	72	32	38	70	96	132	810	52	124	130	738
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.97	1.00		0.98	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776
Adj Flow Rate, veh/h	674	78	10	41	76	7	143	880	14	135	141	149
Adj No. of Lanes	2	1	1	2	1	1	1	3	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	775	601	502	127	250	207	178	1398	427	210	834	361
Arrive On Green	0.24	0.34	0.34	0.04	0.14	0.14	0.11	0.29	0.29	0.06	0.25	0.25
Sat Flow, veh/h	3281	1776	1483	3281	1776	1471	1691	4848	1481	3281	3374	1460
Grp Volume(v), veh/h	674	78	10	41	76	7	143	880	14	135	141	149
Grp Sat Flow(s),veh/h/ln	1640	1776	1483	1640	1776	1471	1691	1616	1481	1640	1687	1460
Q Serve(g_s), s	14.4	2.2	0.3	0.9	2.8	0.3	6.0	11.5	0.5	2.9	2.4	6.3
Cycle Q Clear(g_c), s	14.4	2.2	0.3	0.9	2.8	0.3	6.0	11.5	0.5	2.9	2.4	6.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	775	601	502	127	250	207	178	1398	427	210	834	361
V/C Ratio(X)	0.87	0.13	0.02	0.32	0.30	0.03	0.80	0.63	0.03	0.64	0.17	0.41
Avail Cap(c_a), veh/h	870	1136	948	224	786	651	263	2213	676	224	1245	539
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.9	16.7	16.1	34.2	28.2	27.1	32.0	22.6	18.7	33.4	21.6	23.1
Incr Delay (d2), s/veh	8.7	0.1	0.0	1.5	0.7	0.1	10.5	0.5	0.0	5.6	0.1	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.5	1.1	0.1	0.4	1.4	0.1	3.3	5.2	0.2	1.5	1.1	2.6
LnGrp Delay(d),s/veh	35.6	16.8	16.1	35.7	28.9	27.2	42.5	23.1	18.7	39.1	21.7	23.9
LnGrp LOS	D	B	B	D	C	C	D	C	B	D	C	C
Approach Vol, veh/h		762			124			1037			425	
Approach Delay, s/veh		33.4			31.0			25.7			28.0	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.3	26.4	7.4	30.1	12.3	23.4	21.9	15.6
Change Period (Y+Rc), s	4.6	5.3	4.6	5.3	4.6	5.3	4.6	5.3
Max Green Setting (Gmax), s	5.0	33.4	5.0	46.8	11.4	27.0	19.4	32.4
Max Q Clear Time (g_c+I1), s	4.9	13.5	2.9	4.2	8.0	8.3	16.4	4.8
Green Ext Time (p_c), s	0.0	7.1	0.0	0.8	0.1	6.9	0.8	0.8

Intersection Summary		
HCM 2010 Ctrl Delay	28.9	
HCM 2010 LOS	C	

Intersection	
Intersection Delay, s/veh	11.7
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	260	161	1	0	17	81	15	0	1	88	38	0	22	24	70
Future Vol, veh/h	0	260	161	1	0	17	81	15	0	1	88	38	0	22	24	70
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	0	283	175	1	0	18	88	16	0	1	96	41	0	24	26	76
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	12.9	9.8	10.9	9.9
HCM LOS	B	A	B	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	70%	0%	99%	0%	84%	0%	26%
Vol Right, %	0%	30%	0%	1%	0%	16%	0%	74%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	1	126	260	162	17	96	22	94
LT Vol	1	0	260	0	17	0	22	0
Through Vol	0	88	0	161	0	81	0	24
RT Vol	0	38	0	1	0	15	0	70
Lane Flow Rate	1	137	283	176	18	104	24	102
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.002	0.236	0.48	0.274	0.034	0.173	0.046	0.168
Departure Headway (Hd)	6.926	6.205	6.109	5.601	6.57	5.953	6.956	5.92
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	517	579	591	643	545	603	515	606
Service Time	4.662	3.941	3.833	3.325	4.303	3.686	4.692	3.656
HCM Lane V/C Ratio	0.002	0.237	0.479	0.274	0.033	0.172	0.047	0.168
HCM Control Delay	9.7	10.9	14.4	10.4	9.5	9.9	10	9.9
HCM Lane LOS	A	B	B	B	A	A	A	A
HCM 95th-tile Q	0	0.9	2.6	1.1	0.1	0.6	0.1	0.6

Intersection	
Int Delay, s/veh	85.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	18	333	12	18	104	818	0	0	118	273	0	12
Future Vol, veh/h	18	333	12	18	104	818	0	0	118	273	0	12
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	20	362	13	20	113	889	0	0	128	297	0	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1007	0	0	380	0	0	1021	1459	378	1079	1021	568
Stage 1	-	-	-	-	-	-	413	413	-	602	602	-
Stage 2	-	-	-	-	-	-	608	1046	-	477	419	-
Critical Hdwy	4.17	-	-	4.17	-	-	7.17	6.57	6.27	7.17	6.57	6.27
Critical Hdwy Stg 1	-	-	-	-	-	-	6.17	5.57	-	6.17	5.57	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.17	5.57	-	6.17	5.57	-
Follow-up Hdwy	2.263	-	-	2.263	-	-	3.563	4.063	3.363	3.563	4.063	3.363
Pot Cap-1 Maneuver	669	-	-	1152	-	-	210	126	658	~ 192	232	513
Stage 1	-	-	-	-	-	-	606	585	-	478	481	-
Stage 2	-	-	-	-	-	-	474	299	-	560	582	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	666	-	-	1147	-	-	196	119	653	~ 148	219	509
Mov Cap-2 Maneuver	-	-	-	-	-	-	196	119	-	~ 148	219	-
Stage 1	-	-	-	-	-	-	585	565	-	462	471	-
Stage 2	-	-	-	-	-	-	452	293	-	435	562	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.2	11.9	$ 504.2
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	653	666	-	-	1147	-	-	148	509
HCM Lane V/C Ratio	-	0.196	0.029	-	-	0.017	-	-	2.005	0.026
HCM Control Delay (s)	0	11.9	10.6	-	-	8.2	-	-	$ 525.8	12.3
HCM Lane LOS	A	B	B	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	-	0.7	0.1	-	-	0.1	-	-	23.4	0.1

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	359	0	150	0	378	1003	0	364	370
Future Volume (veh/h)	0	0	0	359	0	150	0	378	1003	0	364	370
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		0.98	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1776	1776	1776	0	1776	1776	0	1776	1776
Adj Flow Rate, veh/h				390	0	28	0	411	530	0	396	195
Adj No. of Lanes				2	0	2	0	2	2	0	2	3
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				7	7	7	0	7	7	0	7	7
Cap, veh/h				655	0	585	0	1649	1268	0	1649	1642
Arrive On Green				0.19	0.00	0.19	0.00	0.49	0.49	0.00	0.49	0.49
Sat Flow, veh/h				3382	0	3019	0	3463	2594	0	3463	3360
Grp Volume(v), veh/h				390	0	28	0	411	530	0	396	195
Grp Sat Flow(s),veh/h/ln				1691	0	1509	0	1687	1297	0	1687	1120
Q Serve(g_s), s				3.3	0.0	0.2	0.0	2.2	4.1	0.0	2.1	1.0
Cycle Q Clear(g_c), s				3.3	0.0	0.2	0.0	2.2	4.1	0.0	2.1	1.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				655	0	585	0	1649	1268	0	1649	1642
V/C Ratio(X)				0.60	0.00	0.05	0.00	0.25	0.42	0.00	0.24	0.12
Avail Cap(c_a), veh/h				1345	0	1200	0	2997	2304	0	2997	2985
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				11.5	0.0	10.2	0.0	4.6	5.1	0.0	4.6	4.3
Incr Delay (d2), s/veh				0.9	0.0	0.0	0.0	0.1	0.2	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.6	0.0	0.1	0.0	1.0	1.4	0.0	1.0	0.3
LnGrp Delay(d),s/veh				12.3	0.0	10.3	0.0	4.7	5.3	0.0	4.7	4.4
LnGrp LOS				B		B		A	A		A	A
Approach Vol, veh/h					418			941			591	
Approach Delay, s/veh					12.2			5.1			4.6	
Approach LOS					B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		20.5				20.5		10.6
Change Period (Y+Rc), s		5.3				5.3		4.6
Max Green Setting (Gmax), s		27.7				27.7		12.4
Max Q Clear Time (g_c+I1), s		6.1				4.1		5.3
Green Ext Time (p_c), s		9.0				9.3		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	6.4
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	190	0	399	0	0	0	0	1191	335	0	593	130
Future Volume (veh/h)	190	0	399	0	0	0	0	1191	335	0	593	130
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776				0	1776	1776	0	1776	1776
Adj Flow Rate, veh/h	207	0	64				0	1295	0	0	645	0
Adj No. of Lanes	2	0	3				0	3	1	0	2	1
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7				0	7	7	0	7	7
Cap, veh/h	444	0	595				0	2856	889	0	1988	889
Arrive On Green	0.13	0.00	0.13				0.00	0.59	0.00	0.00	0.59	0.00
Sat Flow, veh/h	3382	0	4528				0	5007	1509	0	3463	1509
Grp Volume(v), veh/h	207	0	64				0	1295	0	0	645	0
Grp Sat Flow(s),veh/h/ln	1691	0	1509				0	1616	1509	0	1687	1509
Q Serve(g_s), s	2.0	0.0	0.4				0.0	5.3	0.0	0.0	3.4	0.0
Cycle Q Clear(g_c), s	2.0	0.0	0.4				0.0	5.3	0.0	0.0	3.4	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	444	0	595				0	2856	889	0	1988	889
V/C Ratio(X)	0.47	0.00	0.11				0.00	0.45	0.00	0.00	0.32	0.00
Avail Cap(c_a), veh/h	1184	0	1585				0	3791	1180	0	2638	1180
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	14.2	0.0	13.6				0.0	4.1	0.0	0.0	3.7	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.1				0.0	0.1	0.0	0.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.2				0.0	2.3	0.0	0.0	1.5	0.0
LnGrp Delay(d),s/veh	15.0	0.0	13.6				0.0	4.2	0.0	0.0	3.8	0.0
LnGrp LOS	B		B					A			A	
Approach Vol, veh/h		271						1295			645	
Approach Delay, s/veh		14.7						4.2			3.8	
Approach LOS		B						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		26.2		9.3		26.2		
Change Period (Y+Rc), s		5.3		4.6		5.3		
Max Green Setting (Gmax), s		27.7		12.4		27.7		
Max Q Clear Time (g_c+I1), s		7.3		4.0		5.4		
Green Ext Time (p_c), s		13.6		0.6		14.4		

Intersection Summary	
HCM 2010 Ctrl Delay	5.4
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Intersection Delay, s/veh	56.4
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	70	410	60	0	257	230	90	0	30	106	151
Future Vol, veh/h	0	70	410	60	0	257	230	90	0	30	106	151
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	0	74	436	64	0	273	245	96	0	32	113	161
Number of Lanes	0	1	1	0	0	1	1	1	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	3	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	3
HCM Control Delay	71.7	28.8	39.4
HCM LOS	F	D	E

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1
Vol Left, %	10%	100%	0%	100%	0%	0%	40%
Vol Thru, %	37%	0%	87%	0%	100%	0%	50%
Vol Right, %	53%	0%	13%	0%	0%	100%	10%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	287	70	470	257	230	90	599
LT Vol	30	70	0	257	0	0	240
Through Vol	106	0	410	0	230	0	299
RT Vol	151	0	60	0	0	90	60
Lane Flow Rate	305	74	500	273	245	96	637
Geometry Grp	7	8	8	7	7	7	7
Degree of Util (X)	0.79	0.22	1	0.742	0.63	0.228	1
Departure Headway (Hd)	9.31	10.633	10.044	9.774	9.275	8.575	9.456
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	388	340	365	369	389	418	389
Service Time	7.062	8.333	7.744	7.531	7.031	6.332	7.158
HCM Lane V/C Ratio	0.786	0.218	1.37	0.74	0.63	0.23	1.638
HCM Control Delay	39.4	16.3	80	36	26.6	13.9	77.4
HCM Lane LOS	E	C	F	E	D	B	F
HCM 95th-tile Q	6.8	0.8	11.6	5.8	4.1	0.9	11.9

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	240	299	60
Future Vol, veh/h	0	240	299	60
Peak Hour Factor	0.94	0.94	0.94	0.94
Heavy Vehicles, %	4	4	4	4
Mvmt Flow	0	255	318	64
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	3
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	77.4
HCM LOS	F

Lane

Intersection	
Intersection Delay, s/veh	60.1
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	122	126	3	0	192	209	141	0	6	136	88	0	516	431	233
Future Vol, veh/h	0	122	126	3	0	192	209	141	0	6	136	88	0	516	431	233
Peak Hour Factor	0.88	0.92	0.92	0.92	0.88	0.92	0.92	0.92	0.88	0.92	0.92	0.92	0.88	0.92	0.92	0.92
Heavy Vehicles, %	7	0	1	4	7	4	1	3	7	4	4	4	7	0	4	0
Mvmt Flow	0	133	137	3	0	209	227	153	0	7	148	96	0	561	468	253
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	26.2	70.1	23	70
HCM LOS	D	F	C	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	3%	49%	35%	44%
Vol Thru, %	59%	50%	39%	37%
Vol Right, %	38%	1%	26%	20%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	230	251	542	1180
LT Vol	6	122	192	516
Through Vol	136	126	209	431
RT Vol	88	3	141	233
Lane Flow Rate	250	273	589	1283
Geometry Grp	1	1	1	1
Degree of Util (X)	0.588	0.649	1	1
Departure Headway (Hd)	8.464	8.569	7.713	7.699
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	425	423	471	487
Service Time	6.529	6.616	5.801	5.788
HCM Lane V/C Ratio	0.588	0.645	1.251	2.634
HCM Control Delay	23	26.2	70.1	70
HCM Lane LOS	C	D	F	F
HCM 95th-tile Q	3.7	4.5	13.2	13.2



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	290	550	180	260	364	310	60	654	309	210	740	182
Future Volume (veh/h)	290	550	180	260	364	310	60	654	309	210	740	182
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.97	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1854	1900	1863	1900	1900	1759	1881	1863	1881	1881	1759
Adj Flow Rate, veh/h	315	598	171	283	396	217	65	711	235	228	804	135
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	2	2	2	0	0	8	1	2	1	1	8
Cap, veh/h	320	597	170	286	462	249	77	700	581	230	856	671
Arrive On Green	0.18	0.22	0.21	0.16	0.21	0.19	0.05	0.37	0.37	0.13	0.45	0.45
Sat Flow, veh/h	1792	2671	762	1774	2237	1207	1675	1881	1560	1792	1881	1474
Grp Volume(v), veh/h	315	394	375	283	318	295	65	711	235	228	804	135
Grp Sat Flow(s),veh/h/ln	1792	1761	1672	1774	1805	1639	1675	1881	1560	1792	1881	1474
Q Serve(g_s), s	24.5	31.3	31.3	22.3	23.8	24.4	5.4	52.1	15.6	17.8	56.9	7.7
Cycle Q Clear(g_c), s	24.5	31.3	31.3	22.3	23.8	24.4	5.4	52.1	15.6	17.8	56.9	7.7
Prop In Lane	1.00		0.46	1.00		0.74	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	320	394	374	286	373	338	77	700	581	230	856	671
V/C Ratio(X)	0.98	1.00	1.00	0.99	0.85	0.87	0.85	1.02	0.40	0.99	0.94	0.20
Avail Cap(c_a), veh/h	320	394	374	286	373	338	77	700	581	230	856	671
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.3	54.3	54.7	58.6	53.5	54.4	66.3	44.0	32.5	60.9	36.3	22.9
Incr Delay (d2), s/veh	46.0	45.3	47.6	49.8	17.3	21.0	55.4	38.0	0.5	56.3	17.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.2	20.2	19.4	14.9	13.6	13.0	3.7	34.4	6.8	12.4	33.7	3.2
LnGrp Delay(d),s/veh	103.3	99.6	102.3	108.4	70.8	75.4	121.7	81.9	32.9	117.2	54.1	23.0
LnGrp LOS	F	F	F	F	E	E	F	F	C	F	D	C
Approach Vol, veh/h		1084			896			1011			1167	
Approach Delay, s/veh		101.6			84.2			73.1			62.9	
Approach LOS		F			F			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	56.1	26.6	35.3	10.4	67.7	29.0	32.9
Change Period (Y+Rc), s	5.3	5.3	5.7	5.7	5.3	5.3	5.7	5.7
Max Green Setting (Gmax), s	16.7	50.8	20.9	29.6	5.1	62.4	23.3	27.2
Max Q Clear Time (g_c+I1), s	10.8	54.1	24.3	33.3	7.4	58.9	26.5	26.4
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.6

Intersection Summary	
HCM 2010 Ctrl Delay	80.0
HCM 2010 LOS	F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	290	120	908	314	120	100	808	708	310	60	887	290
Future Volume (veh/h)	290	120	908	314	120	100	808	708	310	60	887	290
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827
Adj Flow Rate, veh/h	309	128	672	334	128	26	860	753	171	64	944	187
Adj No. of Lanes	2	1	1	2	1	1	2	2	1	1	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	364	544	453	382	554	461	777	1507	657	81	869	382
Arrive On Green	0.11	0.30	0.30	0.11	0.30	0.30	0.23	0.43	0.43	0.05	0.25	0.25
Sat Flow, veh/h	3375	1827	1520	3375	1827	1521	3375	3471	1513	1740	3471	1525
Grp Volume(v), veh/h	309	128	672	334	128	26	860	753	171	64	944	187
Grp Sat Flow(s),veh/h/ln	1688	1827	1520	1688	1827	1521	1688	1736	1513	1740	1736	1525
Q Serve(g_s), s	13.3	7.8	44.0	14.4	7.8	1.8	34.0	23.2	10.7	5.4	37.0	15.5
Cycle Q Clear(g_c), s	13.3	7.8	44.0	14.4	7.8	1.8	34.0	23.2	10.7	5.4	37.0	15.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	364	544	453	382	554	461	777	1507	657	81	869	382
V/C Ratio(X)	0.85	0.24	1.48	0.87	0.23	0.06	1.11	0.50	0.26	0.79	1.09	0.49
Avail Cap(c_a), veh/h	526	544	453	434	554	461	777	1507	657	141	869	382
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.7	39.2	51.9	64.5	38.6	36.5	56.9	30.2	26.7	69.7	55.4	47.3
Incr Delay (d2), s/veh	8.7	0.2	229.3	16.3	0.2	0.1	65.7	1.2	1.0	15.5	56.5	4.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.6	4.0	47.3	7.6	3.9	0.8	22.8	11.3	4.6	2.9	24.5	7.0
LnGrp Delay(d),s/veh	73.4	39.4	281.1	80.8	38.8	36.5	122.5	31.4	27.6	85.2	111.8	51.7
LnGrp LOS	E	D	F	F	D	D	F	C	C	F	F	D
Approach Vol, veh/h		1109			488			1784			1195	
Approach Delay, s/veh		195.3			67.4			75.0			101.0	
Approach LOS		F			E			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.9	68.1	20.7	48.0	38.0	41.0	19.9	48.8
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	12.6	59.0	19.0	44.0	34.0	37.0	23.0	40.0
Max Q Clear Time (g_c+I1), s	7.4	25.2	16.4	46.0	36.0	39.0	15.3	9.8
Green Ext Time (p_c), s	0.0	18.6	0.3	0.0	0.0	0.0	0.7	4.7

Intersection Summary	
HCM 2010 Ctrl Delay	110.1
HCM 2010 LOS	F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	608	0	640	353	1186	0	0	1539	570
Future Volume (veh/h)	0	0	0	608	0	640	353	1186	0	0	1539	570
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1827	1827	1827	1827	0	0	1827	1827
Adj Flow Rate, veh/h				647	0	599	376	1262	0	0	1637	508
Adj No. of Lanes				0	1	1	1	1	0	0	1	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %				4	4	4	4	4	0	0	4	4
Cap, veh/h				424	0	379	199	1290	0	0	1050	874
Arrive On Green				0.24	0.00	0.24	0.11	0.71	0.00	0.00	0.57	0.57
Sat Flow, veh/h				1740	0	1553	1740	1827	0	0	1827	1520
Grp Volume(v), veh/h				647	0	599	376	1262	0	0	1637	508
Grp Sat Flow(s),veh/h/ln				1740	0	1553	1740	1827	0	0	1827	1520
Q Serve(g_s), s				39.0	0.0	39.0	18.3	105.0	0.0	0.0	92.0	34.1
Cycle Q Clear(g_c), s				39.0	0.0	39.0	18.3	105.0	0.0	0.0	92.0	34.1
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				424	0	379	199	1290	0	0	1050	874
V/C Ratio(X)				1.53	0.00	1.58	1.89	0.98	0.00	0.00	1.56	0.58
Avail Cap(c_a), veh/h				424	0	379	199	1290	0	0	1050	874
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				60.5	0.0	60.5	70.8	22.3	0.0	0.0	34.0	21.7
Incr Delay (d2), s/veh				248.2	0.0	274.5	418.6	19.9	0.0	0.0	255.9	1.1
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				48.0	0.0	45.6	31.9	59.4	0.0	0.0	120.8	14.5
LnGrp Delay(d),s/veh				308.7	0.0	335.0	489.5	42.2	0.0	0.0	289.9	22.8
LnGrp LOS				F		F	F	D			F	C
Approach Vol, veh/h					1246			1638			2145	
Approach Delay, s/veh					321.3			144.9			226.7	
Approach LOS					F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		117.0			21.0	96.0		43.0
Change Period (Y+Rc), s		5.3			4.0	5.3		4.6
Max Green Setting (Gmax), s		111.7			17.0	90.7		38.4
Max Q Clear Time (g_c+I1), s		107.0			20.3	94.0		41.0
Green Ext Time (p_c), s		4.7			0.0	0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	223.5
HCM 2010 LOS	F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	650	0	571	0	0	0	0	889	366	780	1367	0
Future Volume (veh/h)	650	0	571	0	0	0	0	889	366	780	1367	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1827				0	1827	1827	1827	1827	0
Adj Flow Rate, veh/h	691	0	562				0	946	316	830	1454	0
Adj No. of Lanes	0	1	1				0	1	1	1	1	0
Peak Hour Factor	0.94	0.94	0.94				0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4				0	4	4	4	4	0
Cap, veh/h	489	0	437				0	582	484	565	1222	0
Arrive On Green	0.28	0.00	0.28				0.00	0.32	0.32	0.32	0.67	0.00
Sat Flow, veh/h	1740	0	1553				0	1827	1518	1740	1827	0
Grp Volume(v), veh/h	691	0	562				0	946	316	830	1454	0
Grp Sat Flow(s),veh/h/ln	1740	0	1553				0	1827	1518	1740	1827	0
Q Serve(g_s), s	45.0	0.0	45.0				0.0	51.0	28.7	52.0	107.0	0.0
Cycle Q Clear(g_c), s	45.0	0.0	45.0				0.0	51.0	28.7	52.0	107.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	489	0	437				0	582	484	565	1222	0
V/C Ratio(X)	1.41	0.00	1.29				0.00	1.62	0.65	1.47	1.19	0.00
Avail Cap(c_a), veh/h	489	0	437				0	582	484	565	1222	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	57.5	0.0	57.5				0.0	54.5	46.9	54.0	26.5	0.0
Incr Delay (d2), s/veh	197.3	0.0	145.5				0.0	288.8	3.0	220.1	93.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	48.4	0.0	36.9				0.0	72.4	12.4	59.5	85.2	0.0
LnGrp Delay(d),s/veh	254.8	0.0	203.0				0.0	343.3	49.9	274.1	120.4	0.0
LnGrp LOS	F		F					F	D	F	F	
Approach Vol, veh/h		1253						1262			2284	
Approach Delay, s/veh		231.5						269.9			176.3	
Approach LOS		F						F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	56.0	55.0		49.0		111.0		
Change Period (Y+Rc), s	4.0	5.3		4.6		5.3		
Max Green Setting (Gmax), s	52.0	49.7		44.4		105.7		
Max Q Clear Time (g_c+I1), s	54.0	53.0		47.0		109.0		
Green Ext Time (p_c), s	0.0	0.0		0.0		0.0		

Intersection Summary	
HCM 2010 Ctrl Delay	215.3
HCM 2010 LOS	F

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	340	36	54	50	72	430	40	485	30	490	1030	418
Future Vol, veh/h	340	36	54	50	72	430	40	485	30	490	1030	418
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	340	-	0	210	-	210	175	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	362	38	57	53	77	457	43	516	32	521	1096	445

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2777	2739	1098	2758	2739	518	1096	0	0	516	0	0
Stage 1	2138	2138	-	601	601	-	-	-	-	-	-	-
Stage 2	639	601	-	2157	2138	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.236	-	-	2.236	-	-
Pot Cap-1 Maneuver	~ 12	~ 20	256	~ 12	~ 20	554	629	-	-	1040	-	-
Stage 1	~ 64	88	-	484	486	-	-	-	-	-	-	-
Stage 2	461	486	-	62	88	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 9	256	-	~ 9	553	628	-	-	1038	-	-
Mov Cap-2 Maneuver	-	~ 9	-	-	~ 9	-	-	-	-	-	-	-
Stage 1	~ 60	44	-	451	453	-	-	-	-	-	-	-
Stage 2	~ 62	453	-	~ 3	~ 44	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0.8	3
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBL	SBT	SBR
Capacity (veh/h)	628	-	-	-	256	-	9	553	1038	-	-
HCM Lane V/C Ratio	0.068	-	-	-	0.224	-	8.511	0.827	0.502	-	-
HCM Control Delay (s)	11.1	-	-	-	23.1	-	$ 4189.6	35.4	11.9	-	-
HCM Lane LOS	B	-	-	-	C	-	F	E	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-	0.8	-	11	8.4	2.9	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Intersection Delay, s/veh	65.2
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	135	127	100	0	50	123	157	0	40	283	20
Future Vol, veh/h	0	135	127	100	0	50	123	157	0	40	283	20
Peak Hour Factor	0.88	0.92	0.92	0.92	0.88	0.92	0.92	0.92	0.88	0.92	0.92	0.92
Heavy Vehicles, %	7	1	0	4	7	7	0	1	7	3	4	0
Mvmt Flow	0	147	138	109	0	54	134	171	0	43	308	22
Number of Lanes	0	0	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	68.8	32.9	60.7
HCM LOS	F	D	F

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	12%	37%	100%	0%	26%
Vol Thru, %	83%	35%	0%	44%	47%
Vol Right, %	6%	28%	0%	56%	28%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	343	362	50	280	1054
LT Vol	40	135	50	0	271
Through Vol	283	127	0	123	493
RT Vol	20	100	0	157	290
Lane Flow Rate	373	393	54	304	1146
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.934	0.973	0.152	0.767	1
Departure Headway (Hd)	9.014	8.906	10.081	9.068	8.881
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	403	409	356	399	424
Service Time	7.068	6.958	7.833	6.82	6.965
HCM Lane V/C Ratio	0.926	0.961	0.152	0.762	2.703
HCM Control Delay	60.7	68.8	14.6	36.2	75.5
HCM Lane LOS	F	F	B	E	F
HCM 95th-tile Q	10.3	11.5	0.5	6.4	12.3

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	271	493	290
Future Vol, veh/h	0	271	493	290
Peak Hour Factor	0.88	0.92	0.92	0.92
Heavy Vehicles, %	7	2	7	2
Mvmt Flow	0	295	536	315
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	75.5
HCM LOS	F

Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	470	0	360	500	993	0	0	1058	350
Future Volume (veh/h)	0	0	0	470	0	360	500	993	0	0	1058	350
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1827	1827	1827	1827	0	0	1827	1827
Adj Flow Rate, veh/h				511	0	262	543	1079	0	0	1150	291
Adj No. of Lanes				0	1	1	1	1	0	0	1	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				4	4	4	4	4	0	0	4	4
Cap, veh/h				391	0	349	413	1325	0	0	845	702
Arrive On Green				0.22	0.00	0.22	0.24	0.73	0.00	0.00	0.46	0.46
Sat Flow, veh/h				1740	0	1553	1740	1827	0	0	1827	1517
Grp Volume(v), veh/h				511	0	262	543	1079	0	0	1150	291
Grp Sat Flow(s),veh/h/ln				1740	0	1553	1740	1827	0	0	1827	1517
Q Serve(g_s), s				36.0	0.0	25.2	38.0	63.5	0.0	0.0	74.0	20.4
Cycle Q Clear(g_c), s				36.0	0.0	25.2	38.0	63.5	0.0	0.0	74.0	20.4
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				391	0	349	413	1325	0	0	845	702
V/C Ratio(X)				1.31	0.00	0.75	1.31	0.81	0.00	0.00	1.36	0.41
Avail Cap(c_a), veh/h				391	0	349	413	1325	0	0	845	702
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				62.0	0.0	57.8	61.0	14.8	0.0	0.0	43.0	28.6
Incr Delay (d2), s/veh				154.8	0.0	7.8	157.7	3.8	0.0	0.0	170.1	0.1
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				34.1	0.0	11.5	36.3	33.2	0.0	0.0	77.3	8.6
LnGrp Delay(d),s/veh				216.8	0.0	65.6	218.7	18.5	0.0	0.0	213.1	28.7
LnGrp LOS				F		E	F	B			F	C
Approach Vol, veh/h					773			1622			1441	
Approach Delay, s/veh					165.6			85.5			175.9	
Approach LOS					F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		120.0			42.0	78.0		40.0
Change Period (Y+Rc), s		4.9			4.0	4.9		4.9
Max Green Setting (Gmax), s		115.1			38.0	73.1		35.1
Max Q Clear Time (g_c+I1), s		65.5			40.0	76.0		38.0
Green Ext Time (p_c), s		0.6			0.0	0.0		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		135.6
HCM 2010 LOS		F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	470	0	770	0	0	0	0	1023	310	410	1118	0
Future Volume (veh/h)	470	0	770	0	0	0	0	1023	310	410	1118	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1827				0	1827	1900	1827	1827	0
Adj Flow Rate, veh/h	511	0	761				0	1112	329	446	1215	0
Adj No. of Lanes	0	1	1				0	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4				0	4	4	4	4	0
Cap, veh/h	489	0	437				0	657	194	272	1222	0
Arrive On Green	0.28	0.00	0.28				0.00	0.49	0.48	0.16	0.67	0.00
Sat Flow, veh/h	1740	0	1553				0	1347	399	1740	1827	0
Grp Volume(v), veh/h	511	0	761				0	0	1441	446	1215	0
Grp Sat Flow(s),veh/h/ln	1740	0	1553				0	0	1746	1740	1827	0
Q Serve(g_s), s	45.0	0.0	45.0				0.0	0.0	78.0	25.0	105.2	0.0
Cycle Q Clear(g_c), s	45.0	0.0	45.0				0.0	0.0	78.0	25.0	105.2	0.0
Prop In Lane	1.00		1.00				0.00		0.23	1.00		0.00
Lane Grp Cap(c), veh/h	489	0	437				0	0	851	272	1222	0
V/C Ratio(X)	1.04	0.00	1.74				0.00	0.00	1.69	1.64	0.99	0.00
Avail Cap(c_a), veh/h	489	0	437				0	0	851	272	1222	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	57.5	0.0	57.5				0.0	0.0	41.1	67.5	26.2	0.0
Incr Delay (d2), s/veh	52.7	0.0	343.5				0.0	0.0	317.1	304.3	24.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	28.8	0.0	61.0				0.0	0.0	112.5	35.0	60.9	0.0
LnGrp Delay(d),s/veh	110.2	0.0	401.0				0.0	0.0	358.2	371.8	50.5	0.0
LnGrp LOS	F		F						F	F	D	
Approach Vol, veh/h		1272						1441			1661	
Approach Delay, s/veh		284.2						358.2			136.8	
Approach LOS		F						F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	29.0	82.0		49.0		111.0		
Change Period (Y+Rc), s	4.0	4.9		4.9		4.9		
Max Green Setting (Gmax), s	25.0	77.1		44.1		106.1		
Max Q Clear Time (g_c+I1), s	27.0	80.0		47.0		107.2		
Green Ext Time (p_c), s	0.0	0.0		0.0		0.0		

Intersection Summary	
HCM 2010 Ctrl Delay	252.6
HCM 2010 LOS	F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	490	40	46	85	50	200	24	526	40	370	1052	360
Future Volume (veh/h)	490	40	46	85	50	200	24	526	40	370	1052	360
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.95	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1900	1827	1827	1827	1827	1827	1827	1827	1827	1900
Adj Flow Rate, veh/h	521	43	16	90	53	3	26	560	12	394	1119	359
Adj No. of Lanes	1	1	0	2	1	2	1	1	1	2	2	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	548	410	152	146	96	136	33	670	561	467	1255	396
Arrive On Green	0.31	0.32	0.32	0.04	0.05	0.05	0.02	0.37	0.37	0.14	0.49	0.49
Sat Flow, veh/h	1740	1265	471	3375	1827	2589	1740	1827	1530	3375	2581	814
Grp Volume(v), veh/h	521	0	59	90	53	3	26	560	12	394	746	732
Grp Sat Flow(s),veh/h/ln	1740	0	1735	1688	1827	1295	1740	1827	1530	1688	1736	1660
Q Serve(g_s), s	36.7	0.0	3.0	3.3	3.6	0.1	1.9	35.1	0.6	14.3	48.6	50.8
Cycle Q Clear(g_c), s	36.7	0.0	3.0	3.3	3.6	0.1	1.9	35.1	0.6	14.3	48.6	50.8
Prop In Lane	1.00		0.27	1.00		1.00	1.00		1.00	1.00		0.49
Lane Grp Cap(c), veh/h	548	0	562	146	96	136	33	670	561	467	844	807
V/C Ratio(X)	0.95	0.00	0.10	0.62	0.55	0.02	0.79	0.84	0.02	0.84	0.88	0.91
Avail Cap(c_a), veh/h	596	0	595	430	233	330	55	670	561	726	844	807
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.0	0.0	29.7	59.0	58.0	56.4	61.3	36.3	25.3	52.7	29.1	29.6
Incr Delay (d2), s/veh	24.3	0.0	0.1	4.2	4.9	0.1	32.4	11.8	0.1	5.5	13.0	15.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	21.3	0.0	1.4	1.6	1.9	0.1	1.2	19.9	0.3	7.0	26.3	26.7
LnGrp Delay(d),s/veh	66.3	0.0	29.8	63.1	63.0	56.5	93.7	48.0	25.4	58.2	42.1	45.4
LnGrp LOS	E		C	E	E	E	F	D	C	E	D	D
Approach Vol, veh/h		580			146			598			1872	
Approach Delay, s/veh		62.6			62.9			49.6			46.8	
Approach LOS		E			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.4	50.0	9.4	44.7	6.4	65.0	43.5	10.6
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	27.0	38.0	16.0	43.0	4.0	61.0	43.0	16.0
Max Q Clear Time (g_c+I1), s	16.3	37.1	5.3	5.0	3.9	52.8	38.7	5.6
Green Ext Time (p_c), s	1.1	0.8	0.1	0.6	0.0	6.7	0.8	0.3

Intersection Summary	
HCM 2010 Ctrl Delay	50.9
HCM 2010 LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Intersection Delay, s/veh	63.3
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	140	406	42	0	20	150	270	0	12	200	30	0	390	530	273
Future Vol, veh/h	0	140	406	42	0	20	150	270	0	12	200	30	0	390	530	273
Peak Hour Factor	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94
Heavy Vehicles, %	7	4	4	4	7	4	4	4	7	4	4	4	7	4	4	4
Mvmt Flow	0	149	432	45	0	21	160	287	0	13	213	32	0	415	564	290
Number of Lanes	0	1	1	0	0	1	1	0	0	0	1	0	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	2	2
HCM Control Delay	62.5	72.2	36.1	65.9
HCM LOS	F	F	E	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	5%	100%	0%	100%	0%	42%	0%
Vol Thru, %	83%	0%	91%	0%	36%	58%	0%
Vol Right, %	12%	0%	9%	0%	64%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	242	140	448	20	420	920	273
LT Vol	12	140	0	20	0	390	0
Through Vol	200	0	406	0	150	530	0
RT Vol	30	0	42	0	270	0	273
Lane Flow Rate	257	149	477	21	447	979	290
Geometry Grp	6	7	7	7	7	7	7
Degree of Util (X)	0.728	0.401	1	0.058	1	1	0.683
Departure Headway (Hd)	10.18	9.692	9.127	9.817	8.868	9.38	8.469
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	358	372	400	365	411	391	427
Service Time	8.18	7.446	6.881	7.579	6.63	7.135	6.224
HCM Lane V/C Ratio	0.718	0.401	1.192	0.058	1.088	2.504	0.679
HCM Control Delay	36.1	18.8	76.2	13.2	75	77.3	27.7
HCM Lane LOS	E	C	F	B	F	F	D
HCM 95th-tile Q	5.5	1.9	12.1	0.2	12.3	12	5



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1056	122	102	95	97	270	42	331	59	350	990	747
Future Volume (veh/h)	1056	122	102	95	97	270	42	331	59	350	990	747
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827
Adj Flow Rate, veh/h	1123	130	47	101	103	154	45	352	14	372	1053	352
Adj No. of Lanes	2	1	1	2	1	1	1	3	1	2	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	1181	837	700	148	277	230	76	1395	426	151	974	422
Arrive On Green	0.35	0.46	0.46	0.04	0.15	0.15	0.04	0.28	0.28	0.04	0.28	0.28
Sat Flow, veh/h	3375	1827	1528	3375	1827	1515	1740	4988	1524	3375	3471	1504
Grp Volume(v), veh/h	1123	130	47	101	103	154	45	352	14	372	1053	352
Grp Sat Flow(s),veh/h/ln	1688	1827	1528	1688	1827	1515	1740	1663	1524	1688	1736	1504
Q Serve(g_s), s	36.9	4.7	2.0	3.4	5.8	10.9	2.9	6.2	0.8	5.1	32.0	25.1
Cycle Q Clear(g_c), s	36.9	4.7	2.0	3.4	5.8	10.9	2.9	6.2	0.8	5.1	32.0	25.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	1181	837	700	148	277	230	76	1395	426	151	974	422
V/C Ratio(X)	0.95	0.16	0.07	0.68	0.37	0.67	0.59	0.25	0.03	2.46	1.08	0.83
Avail Cap(c_a), veh/h	1208	1093	914	148	519	430	76	1395	426	151	974	422
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.1	18.0	17.3	53.7	43.5	45.7	53.5	31.8	29.8	54.5	41.0	38.5
Incr Delay (d2), s/veh	15.4	0.1	0.0	12.1	0.8	3.4	11.4	0.1	0.0	678.2	53.2	13.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.7	2.4	0.8	1.8	3.0	4.8	1.6	2.9	0.3	16.6	22.5	11.9
LnGrp Delay(d),s/veh	51.5	18.1	17.3	65.8	44.3	49.0	64.9	31.9	29.9	732.6	94.3	51.9
LnGrp LOS	D	B	B	E	D	D	E	C	C	F	F	D
Approach Vol, veh/h		1300			358			411			1777	
Approach Delay, s/veh		46.9			52.4			35.5			219.5	
Approach LOS		D			D			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.7	37.2	9.6	57.5	9.6	37.3	44.5	22.6
Change Period (Y+Rc), s	4.6	5.3	4.6	5.3	4.6	5.3	4.6	5.3
Max Green Setting (Gmax), s	5.1	31.9	5.0	68.2	5.0	32.0	40.8	32.4
Max Q Clear Time (g_c+I1), s	7.1	8.2	5.4	6.7	4.9	34.0	38.9	12.9
Green Ext Time (p_c), s	0.0	11.8	0.0	1.9	0.0	0.0	1.0	1.7

Intersection Summary		
HCM 2010 Ctrl Delay		125.9
HCM 2010 LOS		F

Intersection	
Intersection Delay, s/veh	15.1
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	131	132	1	0	70	161	83	0	0	61	23	0	61	71	291
Future Vol, veh/h	0	131	132	1	0	70	161	83	0	0	61	23	0	61	71	291
Peak Hour Factor	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.88	0.94	0.94	0.94
Heavy Vehicles, %	7	4	4	4	7	4	4	4	7	4	4	4	7	4	4	4
Mvmt Flow	0	139	140	1	0	74	171	88	0	0	65	24	0	65	76	310
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	12.6	14.2	11.5	18
HCM LOS	B	B	B	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	0%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	100%	73%	0%	99%	0%	66%	0%	20%
Vol Right, %	0%	27%	0%	1%	0%	34%	0%	80%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	84	131	133	70	244	61	362
LT Vol	0	0	131	0	70	0	61	0
Through Vol	0	61	0	132	0	161	0	71
RT Vol	0	23	0	1	0	83	0	291
Lane Flow Rate	0	89	139	141	74	260	65	385
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0	0.179	0.284	0.268	0.15	0.469	0.128	0.644
Departure Headway (Hd)	7.388	7.191	7.433	6.916	7.252	6.499	7.103	6.024
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	0	502	486	522	491	550	502	593
Service Time	5.088	4.891	5.133	4.616	5.05	4.296	4.892	3.812
HCM Lane V/C Ratio	0	0.177	0.286	0.27	0.151	0.473	0.129	0.649
HCM Control Delay	10.1	11.5	13.1	12.1	11.3	15	10.9	19.2
HCM Lane LOS	N	B	B	B	B	B	B	C
HCM 95th-tile Q	0	0.6	1.2	1.1	0.5	2.5	0.4	4.6

Intersection	
Int Delay, s/veh	1281.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	12	239	24	91	400	395	11	2	50	991	2	12
Future Vol, veh/h	12	239	24	91	400	395	11	2	50	991	2	12
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	13	254	26	97	426	420	12	2	53	1054	2	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	851	0	0	285	0	0	1140	1342	277	1159	1144	646
Stage 1	-	-	-	-	-	-	298	298	-	834	834	-
Stage 2	-	-	-	-	-	-	842	1044	-	325	310	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.14	6.54	6.24	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-
Follow-up Hdwy	2.236	-	-	2.236	-	-	3.536	4.036	3.336	3.536	4.036	3.336
Pot Cap-1 Maneuver	779	-	-	1266	-	-	176	151	757	~ 171	198	468
Stage 1	-	-	-	-	-	-	706	663	-	~ 360	380	-
Stage 2	-	-	-	-	-	-	356	304	-	~ 683	655	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	776	-	-	1261	-	-	156	136	751	~ 145	178	464
Mov Cap-2 Maneuver	-	-	-	-	-	-	156	136	-	~ 145	178	-
Stage 1	-	-	-	-	-	-	691	649	-	~ 352	349	-
Stage 2	-	-	-	-	-	-	316	279	-	~ 619	641	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.8	14.5	$ 2840.3
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	156	640	776	-	-	1261	-	-	145	377
HCM Lane V/C Ratio	0.075	0.086	0.016	-	-	0.077	-	-	7.271	0.04
HCM Control Delay (s)	29.9	11.2	9.7	-	-	8.1	-	-	$ 2880.2	14.9
HCM Lane LOS	D	B	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0.2	0.3	0.1	-	-	0.2	-	-	117	0.1

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	434	0	210	0	587	763	0	557	340
Future Volume (veh/h)	0	0	0	434	0	210	0	587	763	0	557	340
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		0.98	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1776	1776	1776	0	1776	1776	0	1776	1776
Adj Flow Rate, veh/h				472	0	42	0	638	386	0	605	172
Adj No. of Lanes				2	0	2	0	2	2	0	2	3
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				7	7	7	0	7	7	0	7	7
Cap, veh/h				710	0	634	0	1717	1321	0	1717	1711
Arrive On Green				0.21	0.00	0.21	0.00	0.51	0.51	0.00	0.51	0.51
Sat Flow, veh/h				3382	0	3019	0	3463	2594	0	3463	3361
Grp Volume(v), veh/h				472	0	42	0	638	386	0	605	172
Grp Sat Flow(s),veh/h/ln				1691	0	1509	0	1687	1297	0	1687	1120
Q Serve(g_s), s				4.5	0.0	0.4	0.0	4.0	3.0	0.0	3.8	0.9
Cycle Q Clear(g_c), s				4.5	0.0	0.4	0.0	4.0	3.0	0.0	3.8	0.9
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				710	0	634	0	1717	1321	0	1717	1711
V/C Ratio(X)				0.66	0.00	0.07	0.00	0.37	0.29	0.00	0.35	0.10
Avail Cap(c_a), veh/h				1095	0	977	0	2749	2114	0	2749	2738
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				12.8	0.0	11.2	0.0	5.2	5.0	0.0	5.2	4.5
Incr Delay (d2), s/veh				1.1	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.2	0.0	0.2	0.0	1.9	1.1	0.0	1.7	0.3
LnGrp Delay(d),s/veh				13.9	0.0	11.2	0.0	5.4	5.1	0.0	5.3	4.5
LnGrp LOS				B		B		A	A		A	A
Approach Vol, veh/h					514			1024			777	
Approach Delay, s/veh					13.6			5.3			5.1	
Approach LOS					B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		23.2				23.2		12.0
Change Period (Y+Rc), s		5.3				5.3		4.6
Max Green Setting (Gmax), s		28.7				28.7		11.4
Max Q Clear Time (g_c+I1), s		6.0				5.8		6.5
Green Ext Time (p_c), s		11.7				11.8		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	7.1
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	350	0	1326	0	0	0	0	1000	657	0	761	230
Future Volume (veh/h)	350	0	1326	0	0	0	0	1000	657	0	761	230
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776				0	1776	1776	0	1776	1776
Adj Flow Rate, veh/h	380	0	1288				0	1087	0	0	827	0
Adj No. of Lanes	2	0	3				0	3	1	0	2	1
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7				0	7	7	0	7	7
Cap, veh/h	1200	0	1607				0	2077	647	0	1445	647
Arrive On Green	0.35	0.00	0.35				0.00	0.43	0.00	0.00	0.43	0.00
Sat Flow, veh/h	3382	0	4528				0	5007	1509	0	3463	1509
Grp Volume(v), veh/h	380	0	1288				0	1087	0	0	827	0
Grp Sat Flow(s),veh/h/ln	1691	0	1509				0	1616	1509	0	1687	1509
Q Serve(g_s), s	3.7	0.0	11.7				0.0	7.5	0.0	0.0	8.5	0.0
Cycle Q Clear(g_c), s	3.7	0.0	11.7				0.0	7.5	0.0	0.0	8.5	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	1200	0	1607				0	2077	647	0	1445	647
V/C Ratio(X)	0.32	0.00	0.80				0.00	0.52	0.00	0.00	0.57	0.00
Avail Cap(c_a), veh/h	1288	0	1724				0	2409	750	0	1676	750
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	10.7	0.0	13.3				0.0	9.6	0.0	0.0	9.9	0.0
Incr Delay (d2), s/veh	0.2	0.0	2.6				0.0	0.2	0.0	0.0	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	5.2				0.0	3.4	0.0	0.0	4.0	0.0
LnGrp Delay(d),s/veh	10.9	0.0	15.9				0.0	9.8	0.0	0.0	10.2	0.0
LnGrp LOS	B		B					A			B	
Approach Vol, veh/h		1668						1087			827	
Approach Delay, s/veh		14.8						9.8			10.2	
Approach LOS		B						A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		24.9		20.8		24.9		
Change Period (Y+Rc), s		5.3		4.6		5.3		
Max Green Setting (Gmax), s		22.7		17.4		22.7		
Max Q Clear Time (g_c+I1), s		9.5		13.7		10.5		
Green Ext Time (p_c), s		9.6		2.5		9.0		

Intersection Summary	
HCM 2010 Ctrl Delay	12.2
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

APPENDIX 3.13-8:
TECHNICAL CALCULATIONS –
CUMULATIVE PLUS PROJECT CONDITIONS
FREEWAY LOS

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	12/7/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	Eastbound SR 120
From/To:	Yosemite ON to McKinley OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	4077	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1133	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1601	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1601	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.4	mi/h
Number of lanes, N	3	
Density, D	24.8	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	Eastbound SR 120
Junction:	McKinley Avenue Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4077	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	589	vph
Length of first accel/decel lane	144	ft
Length of second accel/decel lane	369	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	316	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2422	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4077	589	316	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1133	164	88	v
Trucks and buses	12	7	11	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4802	677	370	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.450 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2533 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4802	7050	No
$v_{FO} = v_F - v_R$	4125	7050	No
v_R	677	4200	No
v_3 or v_{av34}	2269 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	Yes	

If yes, v_{12A} = 2744 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2744	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 21.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.359

Space mean speed in ramp influence area, S_R = 56.7 mph

Space mean speed in outer lanes, S_0 = 67.2 mph

Space mean speed for all vehicles, S = 60.8 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	McKinley Ave Loop On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3488	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	25.0	mph
Volume on ramp	130	vph
Length of first accel/decel lane	280	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	335	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	1043	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3488	130	335	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	969	36	93	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4108	149	385	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.585 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 2405 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4257	7050	No
v_3 or v_{av34}	1703 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2405 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4257	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 23.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.357	
Space mean speed in ramp influence area,	S_R = 56.8	mph
Space mean speed in outer lanes,	S_0 = 60.7	mph
Space mean speed for all vehicles,	S = 58.3	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	McKinley Ave Slip On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3618	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	335	vph
Length of first accel/decel lane	260	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	638	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1842	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3618	335	638	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1005	93	177	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4261	385	734	pcph

Estimation of V12 Merge Areas

L_{EQ} = 5341.29 (Equation 13-6 or 13-7)

P_{FM} = 0.653 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 2784 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4646	7050	No
v_3 or v_{av34}	1477 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2784 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4646	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 28.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.390	
Space mean speed in ramp influence area,	S_R = 56.0	mph
Space mean speed in outer lanes,	S_0 = 61.5	mph
Space mean speed for all vehicles,	S = 57.6	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	12/7/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	Eastbound SR 120
From/To:	McKinley SlipON to Airport OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	3953	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1098	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1552	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1552	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	3	
Density, D	24.0	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	Eastbound SR 120
Junction:	Airport Way Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3953	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	638	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	335	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1842	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3953	638	335	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1098	177	93	v
Trucks and buses	12	7	11	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4656	734	393	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 3213.30 (Equation 13-12 or 13-13)

P_{FD} = 0.664 Using Equation 6

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3339 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4656	7050	No
$v_{FO} = v_F - v_R$	3922	7050	No
v_R	734	2100	No
v_3 or v_{av34}	1317 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3339 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3339	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 30.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.364

Space mean speed in ramp influence area, S_R = 56.6 mph

Space mean speed in outer lanes, S_0 = 70.1 mph

Space mean speed for all vehicles, S = 59.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.2

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Airport Way On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3315	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	844	vph
Length of first accel/decel lane	415	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	580	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2060	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3315	844	580	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	921	234	161	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3904	971	667	pcph

Estimation of V12 Merge Areas

L_{EQ} = 4331.03 (Equation 13-6 or 13-7)

P_{FM} = 0.634 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 2474 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4875	7050	No
v_3 or v_{av34}	1430 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2474 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4875	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 29.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.406	
Space mean speed in ramp influence area,	S_R = 55.7	mph
Space mean speed in outer lanes,	S_0 = 61.7	mph
Space mean speed for all vehicles,	S = 57.3	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	12/7/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	SR 120 Eastbound
From/To:	Airport ON to Union OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	4159	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1155	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1633	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1633	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.2	mi/h
Number of lanes, N	3	
Density, D	25.4	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Union Rd Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4159	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	580	vph
Length of first accel/decel lane	245	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	844	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2060	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4159	580	844	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1155	161	234	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4898	667	971	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 7302.84 (Equation 13-12 or 13-13)

P_{FD} = 0.811 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4097 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4898	7050	No
$v_{FO} = v - v_R$	4231	7050	No
v_R	667	2100	No
v_3 or v_{av34}	801 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 4097 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4097	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 37.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.358

Space mean speed in ramp influence area, S_R = 56.8 mph

Space mean speed in outer lanes, S_0 = 71.3 mph

Space mean speed for all vehicles, S = 58.7 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Union Rd On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3579	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	610	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	790	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3579	610	790	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	994	169	219	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4215	701	908	pcph

Estimation of V12 Merge Areas

L_{EQ} = 5390.32 (Equation 13-6 or 13-7)

P_{FM} = 0.668 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 2816 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4916	7050	No
v_3 or v_{av34}	1399 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2816 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4916	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 29.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, M_S = 0.403

Space mean speed in ramp influence area, S_R = 55.7 mph

Space mean speed in outer lanes, S_0 = 61.8 mph

Space mean speed for all vehicles, S = 57.3 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	12/7/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	Eastbound SR 120
From/To:	Yosemite ON to McKinley OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	6746	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1874	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2648	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2648	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	42.9	mi/h
Number of lanes, N	3	
Density, D	61.7	pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	Eastbound SR 120
Junction:	McKinley Ave Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6746	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1676	vph
Length of first accel/decel lane	144	ft
Length of second accel/decel lane	369	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1140	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2422	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6746	1676	1140	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1874	466	317	v
Trucks and buses	12	4	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7945	1899	1324	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.450 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4620 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7945	7050	Yes
$v_{FO} = v_F - v_R$	6046	7050	No
v_R	1899	4200	No
v_3 or v_{av34}	3325 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	Yes	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 5245 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	5245	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 43.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.469

Space mean speed in ramp influence area, S_R = 54.2 mph

Space mean speed in outer lanes, S_0 = 64.7 mph

Space mean speed for all vehicles, S = 57.4 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	McKinley Ave Loop On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5070	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	25.0	mph
Volume on ramp	230	vph
Length of first accel/decel lane	280	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	657	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	1043	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5070	230	657	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1408	64	183	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5971	261	745	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.585 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 3495 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6232	7050	No
v_3 or v_{av34}	2476 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3495 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6232	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 32.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.474	
Space mean speed in ramp influence area,	S_R = 54.1	mph
Space mean speed in outer lanes,	S_0 = 57.4	mph
Space mean speed for all vehicles,	S = 55.4	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	McKinley Ave Slip On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5300	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	657	vph
Length of first accel/decel lane	260	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1221	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1842	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5300	657	1221	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1472	183	339	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6242	745	1384	pcph

Estimation of V12 Merge Areas

L_{EQ} = 10071.31 Equation 13-6 or 13-7)

P_{FM} = 0.746 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 4658 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6987	7050	No
v_3 or v_{av34}	1584 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 4658 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6987	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 45.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 1.164	
Space mean speed in ramp influence area,	S_R = 38.2	mph
Space mean speed in outer lanes,	S_0 = 61.1	mph
Space mean speed for all vehicles,	S = 41.8	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	12/7/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	Eastbound SR 120
From/To:	McKinley SlipON to Airport OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	5957	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1655	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2339	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2339	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	52.5	mi/h
Number of lanes, N	3	
Density, D	44.6	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	Eastbound SR 120
Junction:	Airport Way Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5957	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1221	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	657	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1842	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5957	1221	657	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1655	339	183	v
Trucks and buses	12	4	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7016	1384	763	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 5999.18 (Equation 13-12 or 13-13)

P_{FD} = 0.694 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 5290 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7016	7050	No
$v_{FO} = v - v_{FR}$	5632	7050	No
v_R	1384	2100	No
v_3 or v_{av34}	1726 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 5290 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5290	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\ v_R - 0.009\ L_D$ = 47.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.423

Space mean speed in ramp influence area, S_R = 55.3 mph

Space mean speed in outer lanes, S_0 = 68.5 mph

Space mean speed for all vehicles, S = 58.0 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Airport Way On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4736	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	1146	vph
Length of first accel/decel lane	415	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1240	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2060	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4736	1146	1240	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1316	318	344	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5578	1299	1405	pcph

Estimation of V12 Merge Areas

L_{EQ} = 9123.08 (Equation 13-6 or 13-7)

P_{FM} = 0.728 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 4060 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6877	7050	No
v_3 or v_{av34}	1518 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 4060 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6877	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 44.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 1.112	
Space mean speed in ramp influence area,	S_R = 39.4	mph
Space mean speed in outer lanes,	S_0 = 61.3	mph
Space mean speed for all vehicles,	S = 42.8	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	12/7/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR 120 Eastbound
From/To:	Airport ON to Union OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	5882	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1634	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2309	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2309	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	53.3	mi/h
Number of lanes, N	3	
Density, D	43.3	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Union Rd Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5882	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1240	vph
Length of first accel/decel lane	245	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1146	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2060	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5882	1240	1146	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1634	344	318	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6928	1405	1299	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 10512.77 Equation 13-12 or 13-13)

P_{FD} = 0.828 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 5976 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6928	7050	No
$v_{FO} = v - v_F - v_R$	5523	7050	No
v_R	1405	2100	No
v_3 or v_{av34}	952 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 5976 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5976	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\ v_R - 0.009\ L_{12}$ = 53.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.424

Space mean speed in ramp influence area, S_R = 55.2 mph

Space mean speed in outer lanes, S_0 = 71.3 mph

Space mean speed for all vehicles, S = 57.0 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Eastbound
Junction:	Union Rd On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4642	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	720	vph
Length of first accel/decel lane	550	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1470	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4642	720	1470	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1289	200	408	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5467	816	1666	pcph

Estimation of V12 Merge Areas

L_{EQ} = 9890.17 (Equation 13-6 or 13-7)

P_{FM} = 0.768 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 4197 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6283	7050	No
v_3 or v_{av34}	1270 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 4197 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6283	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 40.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.858	
Space mean speed in ramp influence area,	S_R = 45.3	mph
Space mean speed in outer lanes,	S_0 = 62.2	mph
Space mean speed for all vehicles,	S = 47.9	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Union Rd Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5049	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	720	vph
Length of first accel/decel lane	180	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	630	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2110	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5049	720	630	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1403	200	175	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5947	828	724	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 4998.17 (Equation 13-12 or 13-13)

P_{FD} = 0.692 Using Equation 6

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4372 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5947	7050	No
$v_{FO} = v_F - v_R$	5119	7050	No
v_R	828	2100	No
v_3 or v_{av34}	1575 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 4372 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4372	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 40.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.373

Space mean speed in ramp influence area, S_R = 56.4 mph

Space mean speed in outer lanes, S_0 = 69.1 mph

Space mean speed for all vehicles, S = 59.3 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Union Rd On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4329	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	1140	vph
Length of first accel/decel lane	480	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1030	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2120	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4329	1140	1030	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1203	317	286	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5099	1311	1184	pcph

Estimation of V12 Merge Areas

L_{EQ} = 7355.86 (Equation 13-6 or 13-7)

P_{FM} = 0.695 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 3546 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6410	7050	No
v_3 or v_{av34}	1553 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3546 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6410	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 39.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.779	
Space mean speed in ramp influence area,	S_R = 47.1	mph
Space mean speed in outer lanes,	S_0 = 61.2	mph
Space mean speed for all vehicles,	S = 49.9	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	12/7/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	SR 120 Westbound
From/To:	Union ON to Airport OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	5469	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1519	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2147	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2147	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	57.1	mi/h
Number of lanes, N	3	
Density, D	37.6	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Airport Way Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5469	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1030	vph
Length of first accel/decel lane	185	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1140	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2120	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5469	1030	1140	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1519	286	317	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6441	1184	1311	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 10150.28 Equation 13-12 or 13-13)

P_{FD} = 0.839 Using Equation 6

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 5596 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6441	7050	No
$v_{FO} = v_F - v_R$	5257	7050	No
v_R	1184	2100	No
v_3 or v_{av34}	845 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 5596 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5596	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 50.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.405

Space mean speed in ramp influence area, S_R = 55.7 mph

Space mean speed in outer lanes, S_0 = 71.3 mph

Space mean speed for all vehicles, S = 57.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.2

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	Westbound SR 120
Junction:	Airport Way On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4439	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	726	vph
Length of first accel/decel lane	512	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	509	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1981	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4439	726	509	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1233	202	141	v
Trucks and buses	12	7	11	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5228	835	597	pcph

Estimation of V12 Merge Areas

L_{EQ} = 3631.74 (Equation 13-6 or 13-7)

P_{FM} = 0.628 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 3283 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6063	7050	No
v_3 or v_{av34}	1945 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3283 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6063	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 34.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.515	
Space mean speed in ramp influence area,	S_R = 53.2	mph
Space mean speed in outer lanes,	S_0 = 59.8	mph
Space mean speed for all vehicles,	S = 55.1	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	12/7/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	Westbound SR 120
From/To:	Airport ON to McKinley OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	5165	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1435	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2028	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2028	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	59.4	mi/h
Number of lanes, N	3	
Density, D	34.1	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	McKinley Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5165	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	509	vph
Length of first accel/decel lane	143	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	726	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1981	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5165	509	726	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1435	141	202	v
Trucks and buses	12	7	7	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6083	585	835	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 5016.55 (Equation 13-12 or 13-13)

P_{FD} = 0.734 Using Equation 6

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4622 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6083	7050	No
$v_{FO} = v_F - v_R$	5498	7050	No
v_R	585	2100	No
v_3 or v_{av34}	1461 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 4622 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4622	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 42.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.351

Space mean speed in ramp influence area, S_R = 56.9 mph

Space mean speed in outer lanes, S_0 = 69.5 mph

Space mean speed for all vehicles, S = 59.5 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	Westbound SR 120
Junction:	McKinley Ave Loop On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4656	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	25.0	mph
Volume on ramp	1003	vph
Length of first accel/decel lane	603	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	370	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	897	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4656	1003	370	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1293	279	103	v
Trucks and buses	12	7	11	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5484	1153	434	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.594 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 3260 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6637	7050	No
v_3 or v_{av34}	2224 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3260 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6637	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 35.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.613	
Space mean speed in ramp influence area,	S_R = 50.9	mph
Space mean speed in outer lanes,	S_0 = 58.8	mph
Space mean speed for all vehicles,	S = 53.3	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	Westbound SR 120
Junction:	McKinley Ave Slip On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5659	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	370	vph
Length of first accel/decel lane	285	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1039	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2312	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5659	370	1039	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1572	103	289	v
Trucks and buses	12	7	11	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.966	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6665	425	1218	pcph

Estimation of V12 Merge Areas

L_{EQ} = 8694.10 (Equation 13-6 or 13-7)

P_{FM} = 0.687 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 4580 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7090	7050	Yes
v_3 or v_{av34}	2085 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 4580 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	7090	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 42.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 0.877	
Space mean speed in ramp influence area,	S_R = 44.8	mph
Space mean speed in outer lanes,	S_0 = 59.3	mph
Space mean speed for all vehicles,	S = 48.3	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	12/7/2016
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	Westbound SR 120
From/To:	McKinley SlipON to YosemiteOFF
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	6029	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1675	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2367	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2367	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	51.7	mi/h
Number of lanes, N	3	
Density, D	45.7	pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Union Rd Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5243	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	830	vph
Length of first accel/decel lane	180	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1030	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2110	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5243	830	1030	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1456	231	286	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6175	941	1167	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 8246.83 (Equation 13-12 or 13-13)

P_{FD} = 0.810 Using Equation 6

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 5182 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6175	7050	No
$v_{FO} = v_F - v_R$	5234	7050	No
v_R	941	2100	No
v_3 or v_{av34}	993 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 5182 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5182	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 47.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	D_S = 0.383	
Space mean speed in ramp influence area,	S_R = 56.2	mph
Space mean speed in outer lanes,	S_0 = 71.3	mph
Space mean speed for all vehicles,	S = 58.2	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Union Rd On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4413	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	850	vph
Length of first accel/decel lane	480	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1248	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2120	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4413	850	1248	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1226	236	347	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5198	963	1414	pcph

Estimation of V12 Merge Areas

L_{EQ} = 8784.79 (Equation 13-6 or 13-7)

P_{FM} = 0.724 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 3763 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6161	7050	No
v_3 or v_{av34}	1435 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3763 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6161	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 38.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.718	
Space mean speed in ramp influence area,	S_R = 48.5	mph
Space mean speed in outer lanes,	S_0 = 61.6	mph
Space mean speed for all vehicles,	S = 51.0	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	12/7/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR 120 Westbound
From/To:	Union ON to Airport OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	5263	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1462	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2066	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2066	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	58.7	mi/h
Number of lanes, N	3	
Density, D	35.2	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	Airport Way Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5263	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1248	vph
Length of first accel/decel lane	185	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	850	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2120	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5263	1248	850	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1462	347	236	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6199	1414	963	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 9075.23 (Equation 13-12 or 13-13)

P_{FD} = 0.750 Using Equation 6

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 5001 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6199	7050	No
$v_{FO} = v_F - v_R$	4785	7050	No
v_R	1414	2100	No
v_3 or v_{av34}	1198 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 5001 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5001	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 45.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.425

Space mean speed in ramp influence area, S_R = 55.2 mph

Space mean speed in outer lanes, S_0 = 70.5 mph

Space mean speed for all vehicles, S = 57.6 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.2

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	Westbound SR 120
Junction:	Airport Way On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4015	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	923	vph
Length of first accel/decel lane	512	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	644	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1981	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4015	923	644	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1115	256	179	v
Trucks and buses	12	4	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4729	1046	748	pcph

Estimation of V12 Merge Areas

L_{EQ} = 4550.32 (Equation 13-6 or 13-7)

P_{FM} = 0.648 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 3064 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5775	7050	No
v_3 or v_{av34}	1665 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3064 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5775	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 33.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.513	
Space mean speed in ramp influence area,	S_R = 53.2	mph
Space mean speed in outer lanes,	S_0 = 60.8	mph
Space mean speed for all vehicles,	S = 55.2	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	12/7/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR 120 Westbound
From/To:	Airport ON to McKinley OFF
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Flow Inputs and Adjustments

Volume, V	4938	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1372	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1939	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1939	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	60.9	mi/h
Number of lanes, N	3	
Density, D	31.8	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	SR 120 Westbound
Junction:	McKinley Ave Off-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4938	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	644	vph
Length of first accel/decel lane	143	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	923	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1981	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4938	644	923	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1372	179	256	v
Trucks and buses	12	4	4	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.980	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5816	730	1046	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 7006.59 (Equation 13-12 or 13-13)

P_{FD} = 0.809 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4845 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5816	7050	No
$v_{FO} = v - v_F - v_R$	5086	7050	No
v_R	730	2100	No
v_3 or v_{av34}	971 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 4845 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4845	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\ v_R - 0.009\ L_D$ = 44.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.364

Space mean speed in ramp influence area, S_R = 56.6 mph

Space mean speed in outer lanes, S_0 = 71.3 mph

Space mean speed for all vehicles, S = 58.6 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	Westbound SR 120
Junction:	McKinley Ave Loop On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4294	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	25.0	mph
Volume on ramp	763	vph
Length of first accel/decel lane	603	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	340	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	897	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4294	763	340	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1193	212	94	v
Trucks and buses	12	4	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5057	865	395	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.594 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 3006 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5922	7050	No
v_3 or v_{av34}	2051 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3006 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5922	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 31.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.478	
Space mean speed in ramp influence area,	S_R = 54.0	mph
Space mean speed in outer lanes,	S_0 = 59.4	mph
Space mean speed for all vehicles,	S = 55.8	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Fehr & Peers
Agency/Co.:	Caltrans
Date performed:	12/7/2016
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	Westbound SR 120
Junction:	McKinley Ave Slip On-Ramp
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing EIR

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	5057	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	45.0	mph
Volume on ramp	340	vph
Length of first accel/decel lane	285	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	481	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2312	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5057	340	481	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1405	94	134	v
Trucks and buses	12	4	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.980	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5956	385	558	pcph

Estimation of V12 Merge Areas

L_{EQ} = 3983.01 (Equation 13-6 or 13-7)

P_{FM} = 0.612 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 3646 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6341	7050	No
v_3 or v_{av34}	2310 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3646 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6341	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 35.0- pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.515	
Space mean speed in ramp influence area,	S_R = 53.2	mph
Space mean speed in outer lanes,	S_0 = 58.4	mph
Space mean speed for all vehicles,	S = 55.0	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	Caltrans
Date Performed:	12/7/2016
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	Westbound SR 120
From/To:	McKinley SlipON to YosemiteOFF
Jurisdiction:	District 10
Analysis Year:	Cumulative Plus Project
Description:	Oakwood Landing

Flow Inputs and Adjustments

Volume, V	5397	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1499	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2119	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2119	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	57.7	mi/h
Number of lanes, N	3	
Density, D	36.7	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

APPENDIX 3.13-9:
TECHNICAL CALCULATIONS –
CUMULATIVE PLUS PROJECT CONDITIONS
(MITIGATED)
INTERSECTION LOS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	179	180	0	44	78	426	4	352	156	78	86	61
Future Volume (veh/h)	179	180	0	44	78	426	4	352	156	78	86	61
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1776	1667	1900	1776	1731	1900	1900	1760	1900
Adj Flow Rate, veh/h	195	196	0	48	85	290	4	383	156	85	93	44
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	7	90	90	7	11	11	0	10	10
Cap, veh/h	231	689	0	82	93	318	69	415	169	122	431	204
Arrive On Green	0.13	0.36	0.00	0.05	0.28	0.28	0.04	0.36	0.36	0.07	0.38	0.38
Sat Flow, veh/h	1810	1900	0	1691	328	1120	1691	1161	473	1810	1121	530
Grp Volume(v), veh/h	195	196	0	48	0	375	4	0	539	85	0	137
Grp Sat Flow(s),veh/h/ln	1810	1900	0	1691	0	1449	1691	0	1633	1810	0	1651
Q Serve(g_s), s	10.3	7.2	0.0	2.7	0.0	24.5	0.2	0.0	30.9	4.5	0.0	5.4
Cycle Q Clear(g_c), s	10.3	7.2	0.0	2.7	0.0	24.5	0.2	0.0	30.9	4.5	0.0	5.4
Prop In Lane	1.00		0.00	1.00		0.77	1.00		0.29	1.00		0.32
Lane Grp Cap(c), veh/h	231	689	0	82	0	411	69	0	585	122	0	635
V/C Ratio(X)	0.84	0.28	0.00	0.58	0.00	0.91	0.06	0.00	0.92	0.70	0.00	0.22
Avail Cap(c_a), veh/h	296	689	0	276	0	488	276	0	651	296	0	658
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.7	22.2	0.0	45.6	0.0	33.9	45.1	0.0	30.1	44.7	0.0	20.2
Incr Delay (d2), s/veh	16.1	0.2	0.0	6.4	0.0	19.5	0.3	0.0	17.7	7.0	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	3.8	0.0	1.4	0.0	12.0	0.1	0.0	16.8	2.5	0.0	2.5
LnGrp Delay(d),s/veh	57.8	22.4	0.0	51.9	0.0	53.4	45.5	0.0	47.8	51.6	0.0	20.4
LnGrp LOS	E	C		D		D	D		D	D		C
Approach Vol, veh/h		391			423			543			222	
Approach Delay, s/veh		40.1			53.2			47.8			32.3	
Approach LOS		D			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.6	39.0	8.8	39.5	8.0	41.6	16.5	31.8
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	16.0	39.0	16.0	33.0	16.0	39.0	16.0	33.0
Max Q Clear Time (g_c+I1), s	6.5	32.9	4.7	9.2	2.2	7.4	12.3	26.5
Green Ext Time (p_c), s	0.1	2.1	0.1	3.6	0.0	4.5	0.2	1.3

Intersection Summary	
HCM 2010 Ctrl Delay	45.2
HCM 2010 LOS	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	30	309	315	40	60	583	888	320	80	472	60
Future Volume (veh/h)	110	30	309	315	40	60	583	888	320	80	472	60
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776
Adj Flow Rate, veh/h	120	33	19	342	43	10	634	965	137	87	513	13
Adj No. of Lanes	2	1	1	2	1	1	2	2	1	1	3	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	198	141	115	445	279	230	764	1602	699	109	1486	455
Arrive On Green	0.06	0.08	0.08	0.14	0.16	0.16	0.23	0.47	0.47	0.06	0.31	0.31
Sat Flow, veh/h	3382	1776	1442	3281	1776	1466	3281	3374	1471	1691	4848	1484
Grp Volume(v), veh/h	120	33	19	342	43	10	634	965	137	87	513	13
Grp Sat Flow(s),veh/h/ln	1691	1776	1442	1640	1776	1466	1640	1687	1471	1691	1616	1484
Q Serve(g_s), s	2.3	1.1	0.8	6.6	1.4	0.4	12.0	13.7	3.5	3.3	5.4	0.4
Cycle Q Clear(g_c), s	2.3	1.1	0.8	6.6	1.4	0.4	12.0	13.7	3.5	3.3	5.4	0.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	198	141	115	445	279	230	764	1602	699	109	1486	455
V/C Ratio(X)	0.61	0.23	0.17	0.77	0.15	0.04	0.83	0.60	0.20	0.80	0.35	0.03
Avail Cap(c_a), veh/h	311	435	353	553	571	471	955	1602	699	155	1486	455
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.0	28.2	28.0	27.2	23.8	23.4	23.8	12.6	9.9	30.1	17.6	15.8
Incr Delay (d2), s/veh	3.0	0.8	0.7	5.1	0.3	0.1	5.1	1.7	0.6	16.7	0.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.6	0.3	3.3	0.7	0.2	5.9	6.7	1.5	2.1	2.5	0.2
LnGrp Delay(d),s/veh	33.0	29.0	28.7	32.3	24.0	23.4	28.9	14.3	10.6	46.9	18.2	16.0
LnGrp LOS	C	C	C	C	C	C	C	B	B	D	B	B
Approach Vol, veh/h		172			395			1736			613	
Approach Delay, s/veh		31.7			31.2			19.3			22.2	
Approach LOS		C			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.2	35.0	12.9	9.2	19.2	24.0	7.8	14.2
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	6.0	31.0	11.0	16.0	19.0	18.0	6.0	21.0
Max Q Clear Time (g_c+I1), s	5.3	15.7	8.6	3.1	14.0	7.4	4.3	3.4
Green Ext Time (p_c), s	0.0	9.4	0.3	0.3	1.2	7.2	0.1	0.4

Intersection Summary	
HCM 2010 Ctrl Delay	22.3
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	250	0	780	0	1011	286	0	656	440
Future Volume (veh/h)	0	0	0	250	0	780	0	1011	286	0	656	440
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		0.98	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1776	1776	1776	0	1776	1776	0	1776	1776
Adj Flow Rate, veh/h				272	0	683	0	1099	187	0	713	294
Adj No. of Lanes				2	0	2	0	1	1	0	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				7	7	7	0	7	7	0	7	7
Cap, veh/h				875	0	781	0	1170	954	0	2223	974
Arrive On Green				0.26	0.00	0.26	0.00	0.66	0.65	0.00	0.66	0.66
Sat Flow, veh/h				3382	0	3019	0	1776	1477	0	3463	1477
Grp Volume(v), veh/h				272	0	683	0	1099	187	0	713	294
Grp Sat Flow(s),veh/h/ln				1691	0	1509	0	1776	1477	0	1687	1477
Q Serve(g_s), s				6.3	0.0	21.1	0.0	53.9	5.0	0.0	8.9	8.2
Cycle Q Clear(g_c), s				6.3	0.0	21.1	0.0	53.9	5.0	0.0	8.9	8.2
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				875	0	781	0	1170	954	0	2223	974
V/C Ratio(X)				0.31	0.00	0.87	0.00	0.94	0.20	0.00	0.32	0.30
Avail Cap(c_a), veh/h				922	0	823	0	1196	976	0	2273	995
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				29.0	0.0	34.5	0.0	14.8	7.0	0.0	7.2	7.1
Incr Delay (d2), s/veh				0.2	0.0	10.2	0.0	13.8	0.1	0.0	0.1	0.2
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				3.0	0.0	9.8	0.0	30.4	2.1	0.0	4.1	3.4
LnGrp Delay(d),s/veh				29.3	0.0	44.7	0.0	28.7	7.1	0.0	7.3	7.3
LnGrp LOS				C		D		C	A		A	A
Approach Vol, veh/h					955			1286			1007	
Approach Delay, s/veh					40.3			25.5			7.3	
Approach LOS					D			C			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		68.1				68.1		29.2
Change Period (Y+Rc), s		5.3				5.3		4.6
Max Green Setting (Gmax), s		64.2				64.2		25.9
Max Q Clear Time (g_c+I1), s		55.9				10.9		23.1
Green Ext Time (p_c), s		6.9				25.2		1.5

Intersection Summary	
HCM 2010 Ctrl Delay	24.2
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	370	0	268	0	0	0	0	927	574	0	636	270
Future Volume (veh/h)	370	0	268	0	0	0	0	927	574	0	636	270
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776				0	1776	1776	0	1776	1776
Adj Flow Rate, veh/h	402	0	92				0	1008	364	0	691	166
Adj No. of Lanes	2	0	1				0	1	1	0	2	1
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7				0	7	7	0	7	7
Cap, veh/h	640	0	286				0	1207	1004	0	2292	972
Arrive On Green	0.19	0.00	0.19				0.00	0.68	0.68	0.00	0.68	0.66
Sat Flow, veh/h	3382	0	1509				0	1776	1478	0	3463	1477
Grp Volume(v), veh/h	402	0	92				0	1008	364	0	691	166
Grp Sat Flow(s),veh/h/ln	1691	0	1509				0	1776	1478	0	1687	1477
Q Serve(g_s), s	6.7	0.0	3.2				0.0	25.6	6.4	0.0	5.0	2.6
Cycle Q Clear(g_c), s	6.7	0.0	3.2				0.0	25.6	6.4	0.0	5.0	2.6
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	640	0	286				0	1207	1004	0	2292	972
V/C Ratio(X)	0.63	0.00	0.32				0.00	0.84	0.36	0.00	0.30	0.17
Avail Cap(c_a), veh/h	1443	0	644				0	1632	1358	0	3101	1326
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	22.7	0.0	21.3				0.0	7.2	4.2	0.0	3.9	4.0
Incr Delay (d2), s/veh	1.3	0.0	0.8				0.0	2.8	0.2	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	1.4				0.0	13.3	2.6	0.0	2.3	1.1
LnGrp Delay(d),s/veh	24.0	0.0	22.1				0.0	10.0	4.4	0.0	4.0	4.1
LnGrp LOS	C		C					B	A		A	A
Approach Vol, veh/h		494						1372			857	
Approach Delay, s/veh		23.7						8.5			4.0	
Approach LOS		C						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		45.4		15.5		45.4		
Change Period (Y+Rc), s		5.3		4.6		5.3		
Max Green Setting (Gmax), s		54.7		25.4		54.7		
Max Q Clear Time (g_c+I1), s		27.6		8.7		7.0		
Green Ext Time (p_c), s		12.5		2.3		15.0		

Intersection Summary	
HCM 2010 Ctrl Delay	9.9
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	331	26	73	20	37	400	5	770	30	360	350	194
Future Volume (veh/h)	331	26	73	20	37	400	5	770	30	360	350	194
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1900
Adj Flow Rate, veh/h	360	28	14	22	40	125	5	837	8	391	380	100
Adj No. of Lanes	0	1	1	1	1	1	1	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	0	131	109	34	297	248	9	1106	487	444	1546	402
Arrive On Green	0.00	0.07	0.07	0.02	0.17	0.17	0.01	0.33	0.33	0.26	0.59	0.59
Sat Flow, veh/h	0	1776	1470	1691	1776	1482	1691	3374	1486	1691	2643	687
Grp Volume(v), veh/h	0	28	14	22	40	125	5	837	8	391	241	239
Grp Sat Flow(s),veh/h/ln	0	1776	1470	1691	1776	1482	1691	1687	1486	1691	1687	1643
Q Serve(g_s), s	0.0	0.9	0.6	0.8	1.2	4.8	0.2	13.9	0.2	13.9	4.3	4.4
Cycle Q Clear(g_c), s	0.0	0.9	0.6	0.8	1.2	4.8	0.2	13.9	0.2	13.9	4.3	4.4
Prop In Lane	0.00		1.00	1.00		1.00	1.00		1.00	1.00		0.42
Lane Grp Cap(c), veh/h	0	131	109	34	297	248	9	1106	487	444	987	961
V/C Ratio(X)	0.00	0.21	0.13	0.64	0.13	0.50	0.56	0.76	0.02	0.88	0.24	0.25
Avail Cap(c_a), veh/h	0	625	518	108	625	522	108	1253	552	560	1078	1050
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	27.4	27.2	30.5	22.3	23.8	31.1	18.9	14.3	22.2	6.3	6.3
Incr Delay (d2), s/veh	0.0	0.8	0.5	18.2	0.2	1.6	44.3	2.4	0.0	12.7	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.5	0.2	0.5	0.6	2.1	0.2	6.8	0.1	8.0	2.0	2.0
LnGrp Delay(d),s/veh	0.0	28.2	27.7	48.7	22.5	25.3	75.4	21.2	14.3	34.9	6.4	6.5
LnGrp LOS		C	C	D	C	C	E	C	B	C	A	A
Approach Vol, veh/h		42			187			850			871	
Approach Delay, s/veh		28.0			27.5			21.5			19.2	
Approach LOS		C			C			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.1	25.9	5.9	9.9	4.9	42.0	0.0	15.8
Change Period (Y+Rc), s	4.6	5.3	4.6	5.3	4.6	5.3	4.6	5.3
Max Green Setting (Gmax), s	20.8	23.3	4.0	22.1	4.0	40.1	4.0	22.1
Max Q Clear Time (g_c+I1), s	15.9	15.9	2.8	2.9	2.2	6.4	0.0	6.8
Green Ext Time (p_c), s	0.6	4.6	0.0	0.7	0.0	11.0	0.0	0.6

Intersection Summary		
HCM 2010 Ctrl Delay		21.2
HCM 2010 LOS		C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	320	41	70	10	87	204	70	201	20	91	202	80
Future Volume (veh/h)	320	41	70	10	87	204	70	201	20	91	202	80
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1879	1900	1900	1900	1900	1776	1713	1900	1900	1827	1810
Adj Flow Rate, veh/h	348	45	68	11	95	131	76	218	18	99	220	12
Adj No. of Lanes	0	1	0	1	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	0	0	0	7	12	12	0	4	5
Cap, veh/h	403	52	79	300	118	162	96	284	23	128	359	293
Arrive On Green	0.30	0.30	0.30	0.17	0.17	0.17	0.06	0.18	0.18	0.07	0.20	0.20
Sat Flow, veh/h	1328	172	259	1810	711	980	1691	1557	129	1810	1827	1494
Grp Volume(v), veh/h	461	0	0	11	0	226	76	0	236	99	220	12
Grp Sat Flow(s),veh/h/ln	1759	0	0	1810	0	1691	1691	0	1686	1810	1827	1494
Q Serve(g_s), s	18.3	0.0	0.0	0.4	0.0	9.5	3.3	0.0	9.8	4.0	8.1	0.5
Cycle Q Clear(g_c), s	18.3	0.0	0.0	0.4	0.0	9.5	3.3	0.0	9.8	4.0	8.1	0.5
Prop In Lane	0.75		0.15	1.00		0.58	1.00		0.08	1.00		1.00
Lane Grp Cap(c), veh/h	534	0	0	300	0	280	96	0	307	128	359	293
V/C Ratio(X)	0.86	0.00	0.00	0.04	0.00	0.81	0.79	0.00	0.77	0.77	0.61	0.04
Avail Cap(c_a), veh/h	742	0	0	458	0	428	174	0	475	215	544	445
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.3	0.0	0.0	25.9	0.0	29.7	34.4	0.0	28.7	33.8	27.1	24.1
Incr Delay (d2), s/veh	7.6	0.0	0.0	0.0	0.0	6.5	13.5	0.0	4.0	9.4	1.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.0	0.0	0.0	0.2	0.0	5.0	1.9	0.0	4.9	2.3	4.3	0.2
LnGrp Delay(d),s/veh	31.9	0.0	0.0	25.9	0.0	36.2	48.0	0.0	32.8	43.2	28.8	24.1
LnGrp LOS	C			C		D	D		C	D	C	C
Approach Vol, veh/h		461			237			312			331	
Approach Delay, s/veh		31.9			35.7			36.5			33.0	
Approach LOS		C			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.8	18.8		27.8	8.8	19.8		17.5
Change Period (Y+Rc), s	4.6	5.3		5.3	4.6	5.3		5.3
Max Green Setting (Gmax), s	5.2	20.8		31.2	7.6	22.0		18.7
Max Q Clear Time (g_c+I1), s	10.3	11.8		20.3	5.3	10.1		11.5
Green Ext Time (p_c), s	0.0	1.6		2.2	0.0	1.8		0.7

Intersection Summary	
HCM 2010 Ctrl Delay	33.9
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	270	0	450	0	719	590	0	711	550
Future Volume (veh/h)	0	0	0	270	0	450	0	719	590	0	711	550
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		0.98	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1776	1776	1776	0	1776	1776	0	1776	1776
Adj Flow Rate, veh/h				293	0	331	0	782	148	0	773	151
Adj No. of Lanes				2	0	1	0	2	1	0	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				7	7	7	0	7	7	0	7	7
Cap, veh/h				1067	0	476	0	1172	456	0	1172	512
Arrive On Green				0.32	0.00	0.32	0.00	0.35	0.31	0.00	0.35	0.35
Sat Flow, veh/h				3382	0	1509	0	3463	1472	0	3463	1473
Grp Volume(v), veh/h				293	0	331	0	782	148	0	773	151
Grp Sat Flow(s),veh/h/ln				1691	0	1509	0	1687	1472	0	1687	1473
Q Serve(g_s), s				1.5	0.0	4.6	0.0	4.7	1.8	0.0	4.6	1.8
Cycle Q Clear(g_c), s				1.5	0.0	4.6	0.0	4.7	1.8	0.0	4.6	1.8
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				1067	0	476	0	1172	456	0	1172	512
V/C Ratio(X)				0.27	0.00	0.70	0.00	0.67	0.32	0.00	0.66	0.30
Avail Cap(c_a), veh/h				3278	0	1463	0	15495	6704	0	8103	3537
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				6.1	0.0	7.1	0.0	6.6	6.3	0.0	6.6	5.6
Incr Delay (d2), s/veh				0.1	0.0	0.7	0.0	0.2	0.2	0.0	0.2	0.1
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.7	0.0	1.9	0.0	2.1	0.8	0.0	2.1	0.7
LnGrp Delay(d),s/veh				6.1	0.0	7.8	0.0	6.8	6.4	0.0	6.8	5.7
LnGrp LOS				A		A		A	A		A	A
Approach Vol, veh/h					624			930			924	
Approach Delay, s/veh					7.0			6.8			6.6	
Approach LOS					A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		12.2				12.2		11.5
Change Period (Y+Rc), s		4.9				4.9		4.9
Max Green Setting (Gmax), s		108.1				56.1		22.1
Max Q Clear Time (g_c+I1), s		6.7				6.6		6.6
Green Ext Time (p_c), s		0.7				0.7		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	6.8
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	0	360	0	0	0	0	1089	320	0	691	290
Future Volume (veh/h)	220	0	360	0	0	0	0	1089	320	0	691	290
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776				0	1776	1776	0	1776	1776
Adj Flow Rate, veh/h	239	0	79				0	1184	124	0	751	113
Adj No. of Lanes	2	0	2				0	3	1	0	2	1
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7				0	7	7	0	7	7
Cap, veh/h	781	0	818				0	1803	489	0	1255	490
Arrive On Green	0.23	0.00	0.27				0.00	0.37	0.33	0.00	0.37	0.33
Sat Flow, veh/h	3382	0	3019				0	5007	1472	0	3463	1476
Grp Volume(v), veh/h	239	0	79				0	1184	124	0	751	113
Grp Sat Flow(s),veh/h/ln	1691	0	1509				0	1616	1472	0	1687	1476
Q Serve(g_s), s	1.3	0.0	0.4				0.0	4.5	1.4	0.0	4.0	1.2
Cycle Q Clear(g_c), s	1.3	0.0	0.4				0.0	4.5	1.4	0.0	4.0	1.2
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	781	0	818				0	1803	489	0	1255	490
V/C Ratio(X)	0.31	0.00	0.10				0.00	0.66	0.25	0.00	0.60	0.23
Avail Cap(c_a), veh/h	2581	0	2425				0	23150	6972	0	20177	8767
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	7.1	0.0	6.1				0.0	5.8	5.5	0.0	5.7	5.4
Incr Delay (d2), s/veh	0.1	0.0	0.0				0.0	0.2	0.1	0.0	0.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	0.2				0.0	2.0	0.6	0.0	1.8	0.5
LnGrp Delay(d),s/veh	7.2	0.0	6.1				0.0	6.0	5.6	0.0	5.9	5.5
LnGrp LOS	A		A					A	A		A	A
Approach Vol, veh/h		318						1308			864	
Approach Delay, s/veh		6.9						6.0			5.8	
Approach LOS		A						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		12.3		10.1		12.3		
Change Period (Y+Rc), s		4.9		4.9		4.9		
Max Green Setting (Gmax), s		106.1		17.1		133.1		
Max Q Clear Time (g_c+I1), s		6.5		3.3		6.0		
Green Ext Time (p_c), s		0.9		0.1		0.9		

Intersection Summary	
HCM 2010 Ctrl Delay	6.0
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	620	72	32	38	70	96	132	810	52	124	130	738
Future Volume (veh/h)	620	72	32	38	70	96	132	810	52	124	130	738
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.97	1.00		0.98	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776	1776
Adj Flow Rate, veh/h	674	78	11	41	76	6	143	880	11	135	141	139
Adj No. of Lanes	2	1	1	2	1	1	1	3	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	802	617	515	127	251	208	177	1344	411	211	798	345
Arrive On Green	0.24	0.35	0.35	0.04	0.14	0.14	0.10	0.28	0.28	0.06	0.24	0.24
Sat Flow, veh/h	3281	1776	1483	3281	1776	1471	1691	4848	1481	3281	3374	1459
Grp Volume(v), veh/h	674	78	11	41	76	6	143	880	11	135	141	139
Grp Sat Flow(s),veh/h/ln	1640	1776	1483	1640	1776	1471	1691	1616	1481	1640	1687	1459
Q Serve(g_s), s	14.2	2.2	0.4	0.9	2.8	0.3	6.0	11.7	0.4	2.9	2.4	5.8
Cycle Q Clear(g_c), s	14.2	2.2	0.4	0.9	2.8	0.3	6.0	11.7	0.4	2.9	2.4	5.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	802	617	515	127	251	208	177	1344	411	211	798	345
V/C Ratio(X)	0.84	0.13	0.02	0.32	0.30	0.03	0.81	0.65	0.03	0.64	0.18	0.40
Avail Cap(c_a), veh/h	1056	1241	1036	226	791	656	237	1841	562	307	1123	486
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.1	16.2	15.6	34.0	28.0	26.9	31.8	23.2	19.1	33.2	22.1	23.4
Incr Delay (d2), s/veh	4.8	0.1	0.0	1.5	0.7	0.1	13.7	0.5	0.0	3.2	0.1	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	1.1	0.1	0.4	1.4	0.1	3.5	5.3	0.2	1.4	1.1	2.4
LnGrp Delay(d),s/veh	30.9	16.3	15.6	35.5	28.7	27.0	45.5	23.7	19.2	36.4	22.2	24.2
LnGrp LOS	C	B	B	D	C	C	D	C	B	D	C	C
Approach Vol, veh/h		763			123			1034			415	
Approach Delay, s/veh		29.2			30.8			26.7			27.5	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.3	25.5	7.4	30.6	12.2	22.5	22.4	15.6
Change Period (Y+Rc), s	4.6	5.3	4.6	5.3	4.6	5.3	4.6	5.3
Max Green Setting (Gmax), s	6.8	27.6	5.0	50.8	10.2	24.2	23.4	32.4
Max Q Clear Time (g_c+I1), s	4.9	13.7	2.9	4.2	8.0	7.8	16.2	4.8
Green Ext Time (p_c), s	0.1	5.9	0.0	0.8	0.1	6.4	1.6	0.8

Intersection Summary	
HCM 2010 Ctrl Delay	27.9
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	333	12	18	104	818	0	0	118	273	0	12
Future Volume (veh/h)	18	333	12	18	104	818	0	0	118	273	0	12
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		1.00	0.99		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1900	1776	1776	1900	1776	1776	1900	1776	1776	1900
Adj Flow Rate, veh/h	20	362	12	20	113	646	0	0	0	297	0	2
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	32	997	33	32	131	750	3	3	0	353	0	308
Arrive On Green	0.02	0.58	0.58	0.02	0.58	0.58	0.00	0.00	0.00	0.21	0.00	0.21
Sat Flow, veh/h	1691	1707	57	1691	225	1285	1691	1776	0	1671	0	1456
Grp Volume(v), veh/h	20	0	374	20	0	759	0	0	0	297	0	2
Grp Sat Flow(s),veh/h/ln	1691	0	1764	1691	0	1509	1691	1776	0	1671	0	1456
Q Serve(g_s), s	0.8	0.0	7.2	0.8	0.0	27.2	0.0	0.0	0.0	11.0	0.0	0.1
Cycle Q Clear(g_c), s	0.8	0.0	7.2	0.8	0.0	27.2	0.0	0.0	0.0	11.0	0.0	0.1
Prop In Lane	1.00		0.03	1.00		0.85	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	32	0	1030	32	0	881	3	3	0	353	0	308
V/C Ratio(X)	0.63	0.00	0.36	0.63	0.00	0.86	0.00	0.00	0.00	0.84	0.00	0.01
Avail Cap(c_a), veh/h	105	0	1448	131	0	1263	419	440	0	518	0	451
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.5	0.0	7.1	31.5	0.0	11.2	0.0	0.0	0.0	24.4	0.0	20.1
Incr Delay (d2), s/veh	19.1	0.0	0.2	19.1	0.0	4.4	0.0	0.0	0.0	8.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	3.5	0.5	0.0	12.3	0.0	0.0	0.0	5.8	0.0	0.0
LnGrp Delay(d),s/veh	50.5	0.0	7.3	50.5	0.0	15.7	0.0	0.0	0.0	32.4	0.0	20.1
LnGrp LOS	D		A	D		B				C		C
Approach Vol, veh/h		394			779			0			299	
Approach Delay, s/veh		9.5			16.6			0.0			32.3	
Approach LOS		A			B						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		0.0	5.2	41.7		17.7	5.2	41.7
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	53.0		20.0	4.0	54.0
Max Q Clear Time (g_c+I1), s		0.0	2.8	9.2		13.0	2.8	29.2
Green Ext Time (p_c), s		0.0	0.0	9.9		0.5	0.0	8.5

Intersection Summary	
HCM 2010 Ctrl Delay	17.9
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	116	15	10	90	24	53	1	28	25	1	61
Future Volume (veh/h)	117	116	15	10	90	24	53	1	28	25	1	61
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		0.96	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1900	1776	1776	1900	1900	1776	1900	1776	1776	1900
Adj Flow Rate, veh/h	127	126	12	11	98	15	58	1	1	27	1	0
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	161	411	39	20	262	40	102	2	2	64	68	0
Arrive On Green	0.10	0.26	0.26	0.01	0.17	0.17	0.06	0.06	0.06	0.04	0.04	0.00
Sat Flow, veh/h	1691	1591	152	1691	1496	229	1631	28	28	1691	1776	0
Grp Volume(v), veh/h	127	0	138	11	0	113	60	0	0	27	1	0
Grp Sat Flow(s),veh/h/ln	1691	0	1743	1691	0	1725	1688	0	0	1691	1776	0
Q Serve(g_s), s	2.1	0.0	1.8	0.2	0.0	1.7	1.0	0.0	0.0	0.4	0.0	0.0
Cycle Q Clear(g_c), s	2.1	0.0	1.8	0.2	0.0	1.7	1.0	0.0	0.0	0.4	0.0	0.0
Prop In Lane	1.00		0.09	1.00		0.13	0.97		0.02	1.00		0.00
Lane Grp Cap(c), veh/h	161	0	450	20	0	302	106	0	0	64	68	0
V/C Ratio(X)	0.79	0.00	0.31	0.56	0.00	0.37	0.57	0.00	0.00	0.42	0.01	0.00
Avail Cap(c_a), veh/h	798	0	1493	266	0	934	1032	0	0	916	962	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.7	0.0	8.5	14.1	0.0	10.4	13.0	0.0	0.0	13.5	13.2	0.0
Incr Delay (d2), s/veh	8.3	0.0	0.4	22.1	0.0	0.8	4.7	0.0	0.0	4.3	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	0.9	0.2	0.0	0.8	0.6	0.0	0.0	0.3	0.0	0.0
LnGrp Delay(d),s/veh	20.9	0.0	8.9	36.2	0.0	11.2	17.7	0.0	0.0	17.7	13.3	0.0
LnGrp LOS	C		A	D		B	B			B	B	
Approach Vol, veh/h		265			124			60			28	
Approach Delay, s/veh		14.7			13.4			17.7			17.6	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		6.3	4.8	11.9		5.6	7.2	9.5
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		17.5	4.5	24.5		15.5	13.5	15.5
Max Q Clear Time (g_c+I1), s		3.0	2.2	3.8		2.4	4.1	3.7
Green Ext Time (p_c), s		0.2	0.0	1.2		0.0	0.2	0.9

Intersection Summary	
HCM 2010 Ctrl Delay	14.9
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	49	44	12	945	181	19
Future Vol, veh/h	49	44	12	945	181	19
Conflicting Peds, #/hr	5	5	5	0	0	5
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	53	48	13	1027	197	21

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	752	119	222	0	-	0
Stage 1	212	-	-	-	-	-
Stage 2	540	-	-	-	-	-
Critical Hdwy	6.94	7.04	4.24	-	-	-
Critical Hdwy Stg 1	5.94	-	-	-	-	-
Critical Hdwy Stg 2	5.94	-	-	-	-	-
Follow-up Hdwy	3.57	3.37	2.27	-	-	-
Pot Cap-1 Maneuver	336	894	1308	-	-	-
Stage 1	788	-	-	-	-	-
Stage 2	534	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	326	887	1303	-	-	-
Mov Cap-2 Maneuver	422	-	-	-	-	-
Stage 1	785	-	-	-	-	-
Stage 2	520	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.8	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1303	-	561	-	-
HCM Lane V/C Ratio	0.01	-	0.18	-	-
HCM Control Delay (s)	7.8	0.1	12.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.7	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	122	126	3	192	209	141	6	136	88	516	431	233
Future Volume (veh/h)	122	126	3	192	209	141	6	136	88	516	431	233
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1880	1900	1827	1866	1900	1827	1827	1900	1900	1852	1900
Adj Flow Rate, veh/h	133	137	2	209	227	126	7	148	71	561	468	233
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	1	1	4	1	1	4	4	4	0	4	4
Cap, veh/h	160	325	5	244	255	142	12	202	97	601	579	288
Arrive On Green	0.09	0.18	0.18	0.14	0.23	0.23	0.01	0.18	0.18	0.33	0.50	0.50
Sat Flow, veh/h	1810	1848	27	1740	1122	623	1740	1155	554	1810	1158	576
Grp Volume(v), veh/h	133	0	139	209	0	353	7	0	219	561	0	701
Grp Sat Flow(s),veh/h/ln	1810	0	1875	1740	0	1744	1740	0	1709	1810	0	1734
Q Serve(g_s), s	6.5	0.0	6.0	10.6	0.0	17.7	0.4	0.0	11.0	27.2	0.0	30.7
Cycle Q Clear(g_c), s	6.5	0.0	6.0	10.6	0.0	17.7	0.4	0.0	11.0	27.2	0.0	30.7
Prop In Lane	1.00		0.01	1.00		0.36	1.00		0.32	1.00		0.33
Lane Grp Cap(c), veh/h	160	0	330	244	0	397	12	0	299	601	0	867
V/C Ratio(X)	0.83	0.00	0.42	0.86	0.00	0.89	0.56	0.00	0.73	0.93	0.00	0.81
Avail Cap(c_a), veh/h	160	0	331	288	0	443	77	0	359	680	0	939
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.6	0.0	33.2	38.0	0.0	33.9	44.8	0.0	35.3	29.3	0.0	19.0
Incr Delay (d2), s/veh	29.5	0.0	0.9	19.3	0.0	18.2	34.5	0.0	6.1	18.8	0.0	5.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	3.2	6.4	0.0	10.5	0.3	0.0	5.7	16.7	0.0	15.8
LnGrp Delay(d),s/veh	70.0	0.0	34.1	57.4	0.0	52.0	79.3	0.0	41.4	48.0	0.0	24.0
LnGrp LOS	E		C	E		D	E		D	D		C
Approach Vol, veh/h		272			562			226			1262	
Approach Delay, s/veh		51.7			54.0			42.6			34.7	
Approach LOS		D			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	34.1	19.9	16.7	19.9	4.6	49.3	12.0	24.6
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	34.0	19.0	15.0	16.0	4.0	49.0	8.0	23.0
Max Q Clear Time (g_c+I1), s	29.2	13.0	12.6	8.0	2.4	32.7	8.5	19.7
Green Ext Time (p_c), s	0.9	2.9	0.1	1.7	0.0	5.4	0.0	0.9

Intersection Summary	
HCM 2010 Ctrl Delay	42.1
HCM 2010 LOS	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	290	120	908	314	120	100	808	708	310	60	887	290
Future Volume (veh/h)	290	120	908	314	120	100	808	708	310	60	887	290
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827
Adj Flow Rate, veh/h	309	0	743	334	128	34	860	753	170	64	944	132
Adj No. of Lanes	2	0	2	2	1	1	2	2	1	1	3	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	374	0	858	372	521	433	910	1509	658	82	1059	323
Arrive On Green	0.11	0.00	0.28	0.11	0.28	0.28	0.27	0.43	0.43	0.05	0.21	0.21
Sat Flow, veh/h	3480	0	3039	3375	1827	1520	3375	3471	1513	1740	4988	1523
Grp Volume(v), veh/h	309	0	743	334	128	34	860	753	170	64	944	132
Grp Sat Flow(s),veh/h/ln	1740	0	1520	1688	1827	1520	1688	1736	1513	1740	1663	1523
Q Serve(g_s), s	11.1	0.0	29.5	12.4	6.9	2.1	31.8	19.9	9.1	4.6	23.4	9.5
Cycle Q Clear(g_c), s	11.1	0.0	29.5	12.4	6.9	2.1	31.8	19.9	9.1	4.6	23.4	9.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	374	0	858	372	521	433	910	1509	658	82	1059	323
V/C Ratio(X)	0.83	0.00	0.87	0.90	0.25	0.08	0.95	0.50	0.26	0.78	0.89	0.41
Avail Cap(c_a), veh/h	547	0	1386	372	747	621	929	1509	658	164	1059	323
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.6	0.0	43.4	55.9	35.0	33.3	45.5	25.9	22.9	60.0	48.7	43.2
Incr Delay (d2), s/veh	6.7	0.0	3.5	23.8	0.2	0.1	17.6	1.2	1.0	14.9	11.4	3.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.0	12.8	7.0	3.5	0.9	17.0	9.8	3.9	2.6	11.9	4.3
LnGrp Delay(d),s/veh	62.3	0.0	46.8	79.7	35.2	33.3	63.1	27.1	23.8	74.8	60.0	47.0
LnGrp LOS	E		D	E	D	C	E	C	C	E	E	D
Approach Vol, veh/h		1052			496			1783			1140	
Approach Delay, s/veh		51.4			65.1			44.2			59.4	
Approach LOS		D			E			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	59.3	18.0	39.9	38.3	31.0	17.7	40.2
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	12.0	50.0	14.0	58.0	35.0	27.0	20.0	52.0
Max Q Clear Time (g_c+I1), s	6.0	21.9	14.4	31.5	33.8	25.4	13.1	8.9
Green Ext Time (p_c), s	0.0	16.3	0.0	4.4	0.5	1.4	0.6	4.6

Intersection Summary	
HCM 2010 Ctrl Delay	52.1
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	608	0	640	0	1186	353	0	1539	570
Future Volume (veh/h)	0	0	0	608	0	640	0	1186	353	0	1539	570
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		0.98	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1827	1827	1827	0	1827	1827	0	1827	1827
Adj Flow Rate, veh/h				647	0	603	0	1262	279	0	1637	359
Adj No. of Lanes				2	0	2	0	1	1	0	2	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %				4	4	4	0	4	4	0	4	4
Cap, veh/h				922	0	823	0	1207	986	0	2293	1004
Arrive On Green				0.26	0.00	0.26	0.00	0.66	0.65	0.00	0.66	0.66
Sat Flow, veh/h				3480	0	3106	0	1827	1520	0	3563	1520
Grp Volume(v), veh/h				647	0	603	0	1262	279	0	1637	359
Grp Sat Flow(s),veh/h/ln				1740	0	1553	0	1827	1520	0	1736	1520
Q Serve(g_s), s				18.0	0.0	19.0	0.0	71.0	8.5	0.0	32.5	11.3
Cycle Q Clear(g_c), s				18.0	0.0	19.0	0.0	71.0	8.5	0.0	32.5	11.3
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				922	0	823	0	1207	986	0	2293	1004
V/C Ratio(X)				0.70	0.00	0.73	0.00	1.05	0.28	0.00	0.71	0.36
Avail Cap(c_a), veh/h				1328	0	1185	0	1207	986	0	2293	1004
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				35.7	0.0	36.0	0.0	18.2	8.1	0.0	11.7	8.1
Incr Delay (d2), s/veh				1.2	0.0	1.6	0.0	38.6	0.2	0.0	1.1	0.3
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				8.8	0.0	8.3	0.0	48.2	3.6	0.0	15.8	4.8
LnGrp Delay(d),s/veh				36.9	0.0	37.7	0.0	56.9	8.3	0.0	12.8	8.4
LnGrp LOS				D		D		F	A		B	A
Approach Vol, veh/h					1250			1541			1996	
Approach Delay, s/veh					37.2			48.1			12.0	
Approach LOS					D			D			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		75.0				75.0		32.5
Change Period (Y+Rc), s		5.3				5.3		4.6
Max Green Setting (Gmax), s		69.7				69.7		40.4
Max Q Clear Time (g_c+I1), s		73.0				34.5		21.0
Green Ext Time (p_c), s		0.0				31.3		6.8

Intersection Summary	
HCM 2010 Ctrl Delay	30.2
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	650	0	571	0	0	0	0	889	366	0	1367	780
Future Volume (veh/h)	650	0	571	0	0	0	0	889	366	0	1367	780
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1827				0	1827	1827	0	1827	1827
Adj Flow Rate, veh/h	691	0	591				0	946	272	0	1454	414
Adj No. of Lanes	2	0	1				0	1	1	0	2	1
Peak Hour Factor	0.94	0.94	0.94				0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4				0	4	4	0	4	4
Cap, veh/h	1412	0	630				0	939	781	0	1783	761
Arrive On Green	0.41	0.00	0.41				0.00	0.51	0.51	0.00	0.51	0.50
Sat Flow, veh/h	3480	0	1553				0	1827	1520	0	3563	1520
Grp Volume(v), veh/h	691	0	591				0	946	272	0	1454	414
Grp Sat Flow(s),veh/h/ln	1740	0	1553				0	1827	1520	0	1736	1520
Q Serve(g_s), s	14.6	0.0	36.3				0.0	51.0	10.5	0.0	34.8	18.6
Cycle Q Clear(g_c), s	14.6	0.0	36.3				0.0	51.0	10.5	0.0	34.8	18.6
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	1412	0	630				0	939	781	0	1783	761
V/C Ratio(X)	0.49	0.00	0.94				0.00	1.01	0.35	0.00	0.82	0.54
Avail Cap(c_a), veh/h	1437	0	641				0	939	781	0	1783	761
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	21.9	0.0	28.3				0.0	24.1	14.3	0.0	20.2	17.0
Incr Delay (d2), s/veh	0.3	0.0	21.6				0.0	31.3	0.2	0.0	3.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	0.0	19.2				0.0	33.7	4.4	0.0	17.3	7.9
LnGrp Delay(d),s/veh	22.2	0.0	49.9				0.0	55.5	14.5	0.0	23.2	17.8
LnGrp LOS	C		D					F	B		C	B
Approach Vol, veh/h		1282						1218			1868	
Approach Delay, s/veh		35.0						46.3			22.0	
Approach LOS		C						D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		55.0		44.3		55.0		
Change Period (Y+Rc), s		5.3		4.6		5.3		
Max Green Setting (Gmax), s		49.7		40.4		49.7		
Max Q Clear Time (g_c+I1), s		53.0		38.3		36.8		
Green Ext Time (p_c), s		0.0		1.4		10.3		

Intersection Summary	
HCM 2010 Ctrl Delay	32.6
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	340	36	54	50	72	430	40	485	30	490	1030	418
Future Volume (veh/h)	340	36	54	50	72	430	40	485	30	490	1030	418
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1900
Adj Flow Rate, veh/h	362	38	10	53	77	122	43	516	5	521	1096	399
Adj No. of Lanes	0	1	1	1	1	1	1	2	1	1	2	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	0	129	107	66	316	264	56	980	431	576	1452	519
Arrive On Green	0.00	0.07	0.07	0.04	0.17	0.17	0.03	0.28	0.28	0.33	0.58	0.58
Sat Flow, veh/h	0	1827	1512	1740	1827	1525	1740	3471	1529	1740	2498	892
Grp Volume(v), veh/h	0	38	10	53	77	122	43	516	5	521	755	740
Grp Sat Flow(s),veh/h/ln	0	1827	1512	1740	1827	1525	1740	1736	1529	1740	1736	1655
Q Serve(g_s), s	0.0	1.4	0.4	2.2	2.6	5.1	1.7	8.9	0.2	20.3	23.0	24.1
Cycle Q Clear(g_c), s	0.0	1.4	0.4	2.2	2.6	5.1	1.7	8.9	0.2	20.3	23.0	24.1
Prop In Lane	0.00		1.00	1.00		1.00	1.00		1.00	1.00		0.54
Lane Grp Cap(c), veh/h	0	129	107	66	316	264	56	980	431	576	1009	962
V/C Ratio(X)	0.00	0.29	0.09	0.80	0.24	0.46	0.77	0.53	0.01	0.90	0.75	0.77
Avail Cap(c_a), veh/h	0	567	469	100	570	476	103	1102	485	768	1215	1158
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	31.4	30.9	34.0	25.4	26.4	34.2	21.5	18.4	22.7	11.0	11.3
Incr Delay (d2), s/veh	0.0	1.3	0.4	23.2	0.4	1.3	19.4	0.4	0.0	11.5	2.1	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.8	0.2	1.5	1.3	2.3	1.1	4.3	0.1	11.5	11.5	11.6
LnGrp Delay(d),s/veh	0.0	32.6	31.3	57.2	25.8	27.7	53.5	22.0	18.4	34.3	13.2	13.9
LnGrp LOS		C	C	E	C	C	D	C	B	C	B	B
Approach Vol, veh/h		48			252			564			2016	
Approach Delay, s/veh		32.4			33.3			24.3			18.9	
Approach LOS		C			C			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.2	25.4	7.3	10.3	6.9	46.7	0.0	17.6
Change Period (Y+Rc), s	4.6	5.3	4.6	5.3	4.6	5.3	4.6	5.3
Max Green Setting (Gmax), s	3.6	22.6	4.1	22.1	4.2	49.8	4.0	22.2
Max Q Clear Time (g_c+I1), s	2.3	10.9	4.2	3.4	3.7	26.1	0.0	7.1
Green Ext Time (p_c), s	1.2	8.9	0.0	0.9	0.0	15.2	0.0	0.8

Intersection Summary	
HCM 2010 Ctrl Delay	21.5
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	127	100	50	123	157	40	283	20	271	493	290
Future Volume (veh/h)	135	127	100	50	123	157	40	283	20	271	493	290
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1872	1900	1776	1889	1900	1845	1832	1900	1863	1776	1863
Adj Flow Rate, veh/h	147	138	94	54	134	120	43	308	20	295	536	94
Adj No. of Lanes	0	1	0	1	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	7	0	0	3	4	4	2	7	2
Cap, veh/h	156	147	100	287	154	138	54	346	22	326	633	551
Arrive On Green	0.23	0.23	0.23	0.17	0.17	0.17	0.03	0.20	0.20	0.18	0.36	0.36
Sat Flow, veh/h	678	636	433	1691	906	811	1757	1698	110	1774	1776	1544
Grp Volume(v), veh/h	379	0	0	54	0	254	43	0	328	295	536	94
Grp Sat Flow(s),veh/h/ln	1748	0	0	1691	0	1717	1757	0	1808	1774	1776	1544
Q Serve(g_s), s	20.6	0.0	0.0	2.6	0.0	13.9	2.4	0.0	17.1	15.7	26.9	4.0
Cycle Q Clear(g_c), s	20.6	0.0	0.0	2.6	0.0	13.9	2.4	0.0	17.1	15.7	26.9	4.0
Prop In Lane	0.39		0.25	1.00		0.47	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	403	0	0	287	0	291	54	0	368	326	633	551
V/C Ratio(X)	0.94	0.00	0.00	0.19	0.00	0.87	0.79	0.00	0.89	0.91	0.85	0.17
Avail Cap(c_a), veh/h	403	0	0	327	0	332	75	0	384	330	633	551
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.5	0.0	0.0	34.4	0.0	39.1	46.5	0.0	37.4	38.6	28.7	21.3
Incr Delay (d2), s/veh	30.0	0.0	0.0	0.3	0.0	19.7	32.1	0.0	21.4	26.9	10.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.3	0.0	0.0	1.3	0.0	8.2	1.6	0.0	10.7	10.1	14.9	1.7
LnGrp Delay(d),s/veh	66.5	0.0	0.0	34.7	0.0	58.8	78.6	0.0	58.8	65.5	39.0	21.4
LnGrp LOS	E			C		E	E		E	E	D	C
Approach Vol, veh/h		379			308			371			925	
Approach Delay, s/veh		66.5			54.6			61.1			45.7	
Approach LOS		E			D			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.4	25.0		27.6	7.6	39.8		21.7
Change Period (Y+Rc), s	4.6	5.3		5.3	4.6	5.3		5.3
Max Green Setting (Gmax), s	18.6	20.5		22.3	4.1	34.4		18.7
Max Q Clear Time (g_c+I1), s	17.7	19.1		22.6	4.4	28.9		15.9
Green Ext Time (p_c), s	0.0	0.6		0.0	0.0	2.4		0.4

Intersection Summary		
HCM 2010 Ctrl Delay	53.9	
HCM 2010 LOS	D	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	470	0	360	0	993	500	0	1058	350
Future Volume (veh/h)	0	0	0	470	0	360	0	993	500	0	1058	350
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		0.98	1.00		0.98
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1827	1827	1827	0	1827	1827	0	1827	1827
Adj Flow Rate, veh/h				511	0	308	0	1079	170	0	1150	125
Adj No. of Lanes				2	0	1	0	2	1	0	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				4	4	4	0	4	4	0	4	4
Cap, veh/h				996	0	445	0	1475	595	0	1475	644
Arrive On Green				0.29	0.00	0.29	0.00	0.42	0.39	0.00	0.42	0.42
Sat Flow, veh/h				3480	0	1553	0	3563	1516	0	3563	1516
Grp Volume(v), veh/h				511	0	308	0	1079	170	0	1150	125
Grp Sat Flow(s),veh/h/ln				1740	0	1553	0	1736	1516	0	1736	1516
Q Serve(g_s), s				3.4	0.0	4.9	0.0	7.2	2.1	0.0	7.9	1.4
Cycle Q Clear(g_c), s				3.4	0.0	4.9	0.0	7.2	2.1	0.0	7.9	1.4
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				996	0	445	0	1475	595	0	1475	644
V/C Ratio(X)				0.51	0.00	0.69	0.00	0.73	0.29	0.00	0.78	0.19
Avail Cap(c_a), veh/h				4523	0	2018	0	14538	6300	0	9275	4052
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				8.3	0.0	8.8	0.0	6.6	5.8	0.0	6.8	5.0
Incr Delay (d2), s/veh				0.2	0.0	0.7	0.0	0.3	0.1	0.0	0.3	0.1
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.7	0.0	2.1	0.0	3.4	0.9	0.0	3.7	0.6
LnGrp Delay(d),s/veh				8.4	0.0	9.5	0.0	6.9	5.9	0.0	7.2	5.0
LnGrp LOS				A		A		A	A		A	A
Approach Vol, veh/h					819			1249			1275	
Approach Delay, s/veh					8.8			6.8			7.0	
Approach LOS					A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		15.8				15.8		11.9
Change Period (Y+Rc), s		4.9				4.9		4.9
Max Green Setting (Gmax), s		115.1				73.1		35.1
Max Q Clear Time (g_c+I1), s		9.2				9.9		6.9
Green Ext Time (p_c), s		1.0				1.0		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	7.4
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	470	0	770	0	0	0	0	1023	310	0	1118	410
Future Volume (veh/h)	470	0	770	0	0	0	0	1023	310	0	1118	410
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1827				0	1827	1827	0	1827	1827
Adj Flow Rate, veh/h	511	0	740				0	1112	119	0	1215	157
Adj No. of Lanes	2	0	2				0	3	1	0	2	1
Peak Hour Factor	0.92	0.92	0.92				0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4				0	4	4	0	4	4
Cap, veh/h	1108	0	989				0	2149	610	0	1496	610
Arrive On Green	0.32	0.00	0.32				0.00	0.43	0.40	0.00	0.43	0.40
Sat Flow, veh/h	3480	0	3106				0	5152	1516	0	3563	1516
Grp Volume(v), veh/h	511	0	740				0	1112	119	0	1215	157
Grp Sat Flow(s),veh/h/ln	1740	0	1553				0	1663	1516	0	1736	1516
Q Serve(g_s), s	3.7	0.0	6.8				0.0	5.2	1.6	0.0	9.8	2.2
Cycle Q Clear(g_c), s	3.7	0.0	6.8				0.0	5.2	1.6	0.0	9.8	2.2
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	1108	0	989				0	2149	610	0	1496	610
V/C Ratio(X)	0.46	0.00	0.75				0.00	0.52	0.19	0.00	0.81	0.26
Avail Cap(c_a), veh/h	4910	0	4382				0	12197	3665	0	11645	5043
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	8.7	0.0	9.7				0.0	6.6	6.2	0.0	7.9	6.3
Incr Delay (d2), s/veh	0.1	0.0	0.4				0.0	0.1	0.1	0.0	0.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	2.9				0.0	2.4	0.7	0.0	4.6	0.9
LnGrp Delay(d),s/veh	8.8	0.0	10.2				0.0	6.7	6.2	0.0	8.4	6.4
LnGrp LOS	A		B					A	A		A	A
Approach Vol, veh/h		1251						1231			1372	
Approach Delay, s/veh		9.6						6.7			8.1	
Approach LOS		A						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		17.7		14.2		17.7		
Change Period (Y+Rc), s		4.9		4.9		4.9		
Max Green Setting (Gmax), s		77.1		44.1		106.1		
Max Q Clear Time (g_c+I1), s		7.2		8.8		11.8		
Green Ext Time (p_c), s		1.1		0.5		1.1		

Intersection Summary	
HCM 2010 Ctrl Delay	8.1
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1056	122	102	95	97	270	42	331	59	350	990	747
Future Volume (veh/h)	1056	122	102	95	97	270	42	331	59	350	990	747
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.97	1.00		0.98	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827	1827
Adj Flow Rate, veh/h	1123	130	38	101	103	105	45	352	12	372	1053	362
Adj No. of Lanes	2	1	1	2	1	1	1	3	1	2	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	1104	740	618	162	230	190	78	1215	371	425	1126	489
Arrive On Green	0.33	0.40	0.40	0.05	0.13	0.13	0.04	0.24	0.24	0.13	0.32	0.32
Sat Flow, veh/h	3375	1827	1527	3375	1827	1511	1740	4988	1522	3375	3471	1507
Grp Volume(v), veh/h	1123	130	38	101	103	105	45	352	12	372	1053	362
Grp Sat Flow(s),veh/h/ln	1688	1827	1527	1688	1827	1511	1740	1663	1522	1688	1736	1507
Q Serve(g_s), s	36.4	5.1	1.7	3.3	5.8	7.3	2.8	6.4	0.7	12.1	32.7	23.8
Cycle Q Clear(g_c), s	36.4	5.1	1.7	3.3	5.8	7.3	2.8	6.4	0.7	12.1	32.7	23.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	1104	740	618	162	230	190	78	1215	371	425	1126	489
V/C Ratio(X)	1.02	0.18	0.06	0.62	0.45	0.55	0.58	0.29	0.03	0.88	0.94	0.74
Avail Cap(c_a), veh/h	1104	993	830	252	532	440	78	1228	375	425	1135	493
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.5	21.2	20.2	52.0	45.1	45.7	52.1	34.3	32.1	47.8	36.5	33.4
Incr Delay (d2), s/veh	31.5	0.1	0.0	3.9	1.4	2.5	9.9	0.1	0.0	18.2	13.9	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	21.7	2.6	0.7	1.6	3.0	3.2	1.6	2.9	0.3	6.7	17.8	10.7
LnGrp Delay(d),s/veh	68.9	21.3	20.3	55.9	46.4	48.2	62.1	34.4	32.1	66.0	50.3	39.3
LnGrp LOS	F	C	C	E	D	D	E	C	C	E	D	D
Approach Vol, veh/h		1291			309			409			1787	
Approach Delay, s/veh		62.7			50.1			37.4			51.4	
Approach LOS		E			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.6	32.4	9.9	50.4	9.6	41.4	41.0	19.3
Change Period (Y+Rc), s	4.6	5.3	4.6	5.3	4.6	5.3	4.6	5.3
Max Green Setting (Gmax), s	14.0	27.4	8.3	60.5	5.0	36.4	36.4	32.4
Max Q Clear Time (g_c+I1), s	11.4	8.4	5.3	7.1	4.8	34.7	38.4	9.3
Green Ext Time (p_c), s	0.0	10.4	0.1	1.7	0.0	1.4	0.0	1.6

Intersection Summary		
HCM 2010 Ctrl Delay		53.6
HCM 2010 LOS		D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	239	24	91	400	395	11	2	50	991	2	12
Future Volume (veh/h)	12	239	24	91	400	395	11	2	50	991	2	12
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1900	1827	1827	1900	1827	1827	1900	1827	1827	1900
Adj Flow Rate, veh/h	13	254	24	97	426	398	12	2	0	1067	0	0
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	2	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	20	743	70	119	438	409	63	67	0	1143	600	0
Arrive On Green	0.01	0.45	0.45	0.07	0.51	0.51	0.04	0.04	0.00	0.33	0.00	0.00
Sat Flow, veh/h	1740	1640	155	1740	858	802	1740	1827	0	3480	1827	0
Grp Volume(v), veh/h	13	0	278	97	0	824	12	2	0	1067	0	0
Grp Sat Flow(s),veh/h/ln	1740	0	1795	1740	0	1660	1740	1827	0	1740	1827	0
Q Serve(g_s), s	1.0	0.0	14.1	7.8	0.0	68.1	0.9	0.1	0.0	41.9	0.0	0.0
Cycle Q Clear(g_c), s	1.0	0.0	14.1	7.8	0.0	68.1	0.9	0.1	0.0	41.9	0.0	0.0
Prop In Lane	1.00		0.09	1.00		0.48	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	20	0	813	119	0	847	63	67	0	1143	600	0
V/C Ratio(X)	0.66	0.00	0.34	0.82	0.00	0.97	0.19	0.03	0.00	0.93	0.00	0.00
Avail Cap(c_a), veh/h	49	0	813	210	0	871	197	207	0	1234	648	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	69.5	0.0	25.0	64.8	0.0	33.6	65.9	65.5	0.0	45.8	0.0	0.0
Incr Delay (d2), s/veh	31.8	0.0	0.2	12.6	0.0	23.7	1.4	0.2	0.0	12.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	7.1	4.2	0.0	36.7	0.5	0.1	0.0	22.1	0.0	0.0
LnGrp Delay(d),s/veh	101.2	0.0	25.2	77.4	0.0	57.3	67.4	65.7	0.0	58.1	0.0	0.0
LnGrp LOS	F		C	E		E	E	E		E		
Approach Vol, veh/h		291			921			14			1067	
Approach Delay, s/veh		28.6			59.4			67.1			58.1	
Approach LOS		C			E			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		9.1	13.6	67.9		50.3	5.6	76.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	17.0	61.0		50.0	4.0	74.0
Max Q Clear Time (g_c+I1), s		2.9	9.8	16.1		43.9	3.0	70.1
Green Ext Time (p_c), s		0.0	0.1	9.5		2.5	0.0	1.9

Intersection Summary	
HCM 2010 Ctrl Delay	55.0
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	332	133	66	46	122	87	29	5	19	143	5	311
Future Volume (veh/h)	332	133	66	46	122	87	29	5	19	143	5	311
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		1.00	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1900	1827	1827	1900	1900	1827	1900	1827	1827	1900
Adj Flow Rate, veh/h	353	141	52	49	130	64	31	5	0	152	5	41
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	435	500	184	70	213	105	63	10	0	230	22	179
Arrive On Green	0.25	0.40	0.40	0.04	0.19	0.19	0.04	0.04	0.00	0.13	0.13	0.13
Sat Flow, veh/h	1740	1263	466	1740	1141	562	1508	243	0	1740	165	1351
Grp Volume(v), veh/h	353	0	193	49	0	194	36	0	0	152	0	46
Grp Sat Flow(s),veh/h/ln	1740	0	1729	1740	0	1702	1752	0	0	1740	0	1515
Q Serve(g_s), s	8.8	0.0	3.5	1.3	0.0	4.8	0.9	0.0	0.0	3.8	0.0	1.3
Cycle Q Clear(g_c), s	8.8	0.0	3.5	1.3	0.0	4.8	0.9	0.0	0.0	3.8	0.0	1.3
Prop In Lane	1.00		0.27	1.00		0.33	0.86		0.00	1.00		0.89
Lane Grp Cap(c), veh/h	435	0	685	70	0	318	73	0	0	230	0	200
V/C Ratio(X)	0.81	0.00	0.28	0.70	0.00	0.61	0.49	0.00	0.00	0.66	0.00	0.23
Avail Cap(c_a), veh/h	885	0	1201	260	0	571	664	0	0	584	0	508
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	16.3	0.0	9.5	21.9	0.0	17.2	21.7	0.0	0.0	19.1	0.0	17.9
Incr Delay (d2), s/veh	3.7	0.0	0.2	11.7	0.0	1.9	5.1	0.0	0.0	3.2	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.7	0.0	1.7	0.8	0.0	2.4	0.6	0.0	0.0	2.0	0.0	0.6
LnGrp Delay(d),s/veh	20.0	0.0	9.7	33.6	0.0	19.1	26.7	0.0	0.0	22.3	0.0	18.5
LnGrp LOS	C		A	C		B	C			C		B
Approach Vol, veh/h		546			243			36			198	
Approach Delay, s/veh		16.4			22.1			26.7			21.4	
Approach LOS		B			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		6.4	6.4	22.8		10.6	16.0	13.1
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		17.5	6.9	32.1		15.5	23.5	15.5
Max Q Clear Time (g_c+I1), s		2.9	3.3	5.5		5.8	10.8	6.8
Green Ext Time (p_c), s		0.1	0.0	2.1		0.5	0.8	1.3

Intersection Summary	
HCM 2010 Ctrl Delay	19.1
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	52	34	19	380	1146	41
Future Vol, veh/h	52	34	19	380	1146	41
Conflicting Peds, #/hr	5	5	5	0	0	5
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	55	36	20	404	1219	44

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1489	641	1268	0	-	0
Stage 1	1246	-	-	-	-	-
Stage 2	243	-	-	-	-	-
Critical Hdwy	6.88	6.98	4.18	-	-	-
Critical Hdwy Stg 1	5.88	-	-	-	-	-
Critical Hdwy Stg 2	5.88	-	-	-	-	-
Follow-up Hdwy	3.54	3.34	2.24	-	-	-
Pot Cap-1 Maneuver	113	413	533	-	-	-
Stage 1	231	-	-	-	-	-
Stage 2	769	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	107	410	531	-	-	-
Mov Cap-2 Maneuver	191	-	-	-	-	-
Stage 1	230	-	-	-	-	-
Stage 2	728	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	28.6	0.9	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	531	-	242	-	-
HCM Lane V/C Ratio	0.038	-	0.378	-	-
HCM Control Delay (s)	12	0.3	28.6	-	-
HCM Lane LOS	B	A	D	-	-
HCM 95th %tile Q(veh)	0.1	-	1.7	-	-

APPENDIX 3.13-10:
TECHNICAL CALCULATIONS –
PEAK HOUR SIGNAL WARRANTS

FEHR PEERS

Major Street	Yosemite Avenue
Minor Street	McKinley Avenue

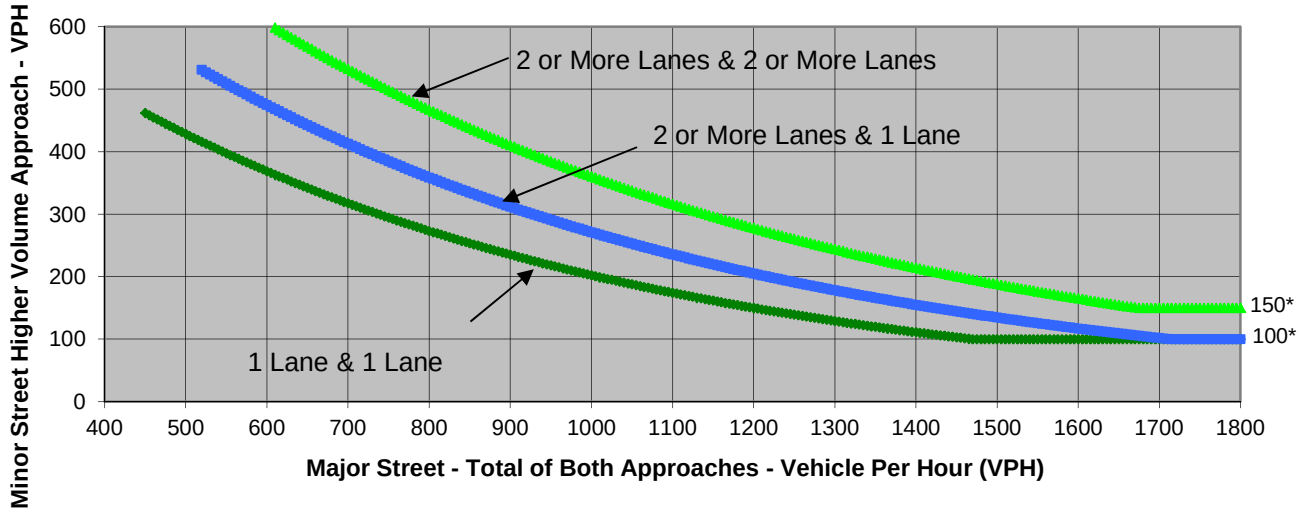
Project	Oakwood Landing
Scenario	Existing Conditions
Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	69	77	18	23
Through	33	24	121	196
Right	24	30	21	0
Total	126	131	160	219

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Yosemite Avenue	McKinley Avenue	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**379**	**131**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

Major Street	McKinley Avenue
Minor Street	Woodward Avenue

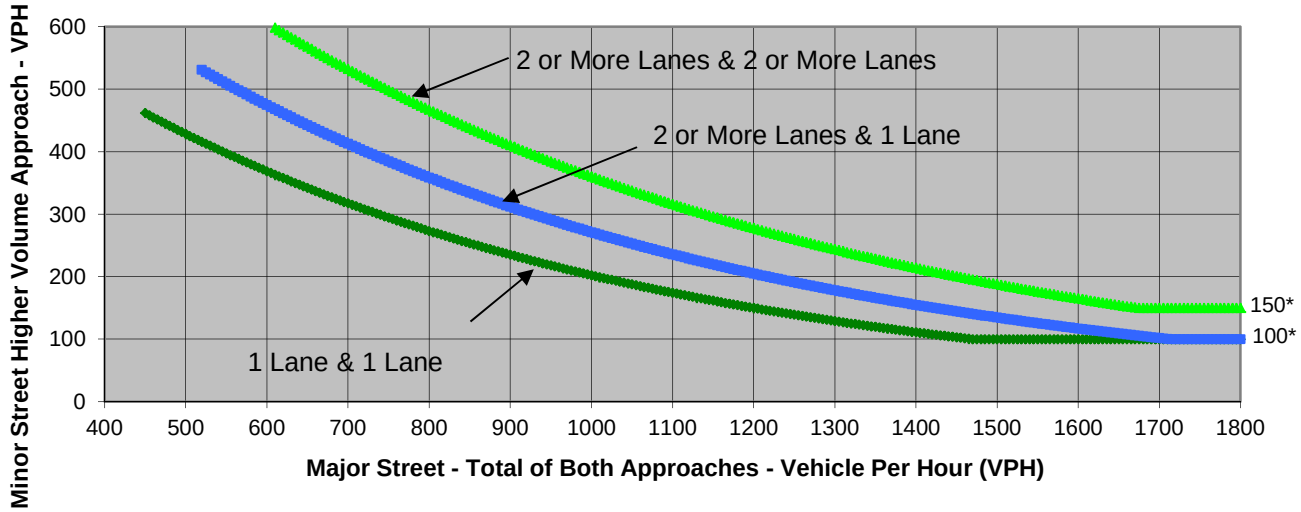
Project	Oakwood Landing
Scenario	Existing Conditions
Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	0	24	51	
Through	0	0	112	64
Right	0	21	0	45
Total	0	45	163	109

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	McKinley Avenue	Woodward Avenue	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**272**	**45**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

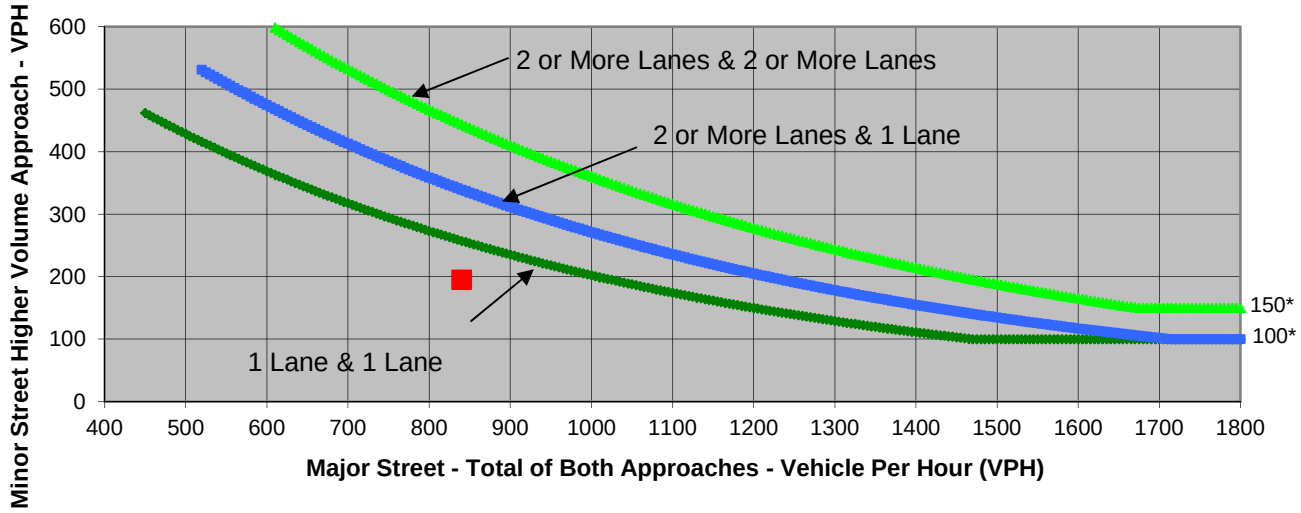
Major Street	Airport Way	Project	Oakwood Landing
Minor Street	Atherton Drive	Scenario	Existing Conditions
		Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	3	50	173	6
Through	414	265	2	0
Right	3	105	20	91
Total	420	420	195	97

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Airport Way	Atherton Drive	
Number of Approach Lanes	**2**	**2**	**NO**
Traffic Volume (VPH) *	**840**	**195**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

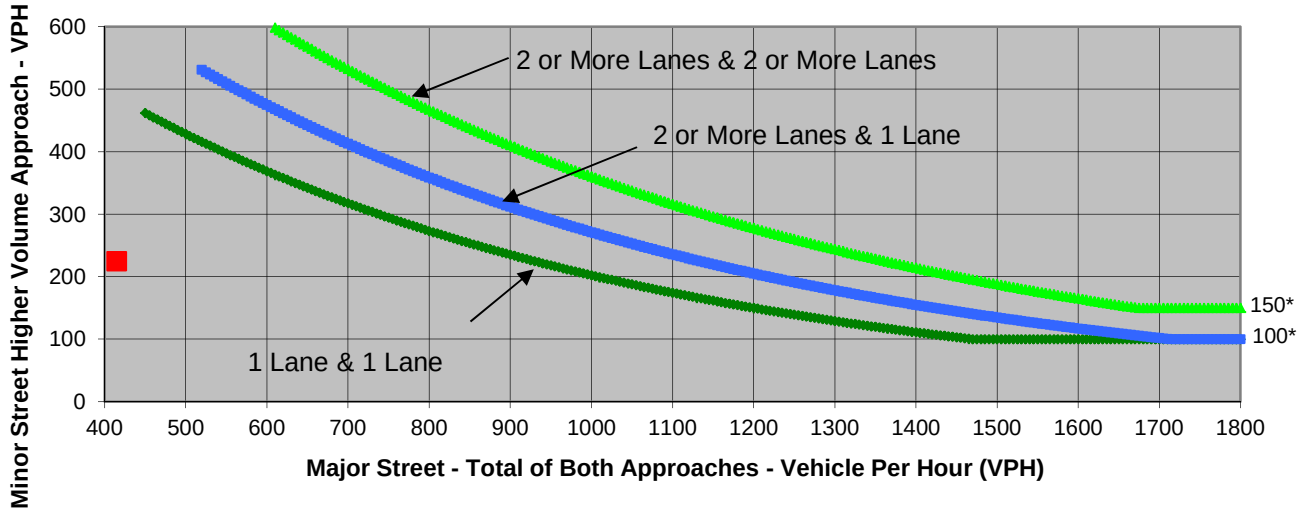
Major Street	Airport Way	Project	Oakwood Landing
Minor Street	Woodward Avenue	Scenario	Existing Conditions
		Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	58	35	133	3
Through	145	114	22	11
Right	6	57	70	71
Total	209	206	225	85

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Airport Way	Woodward Avenue	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**415**	**225**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

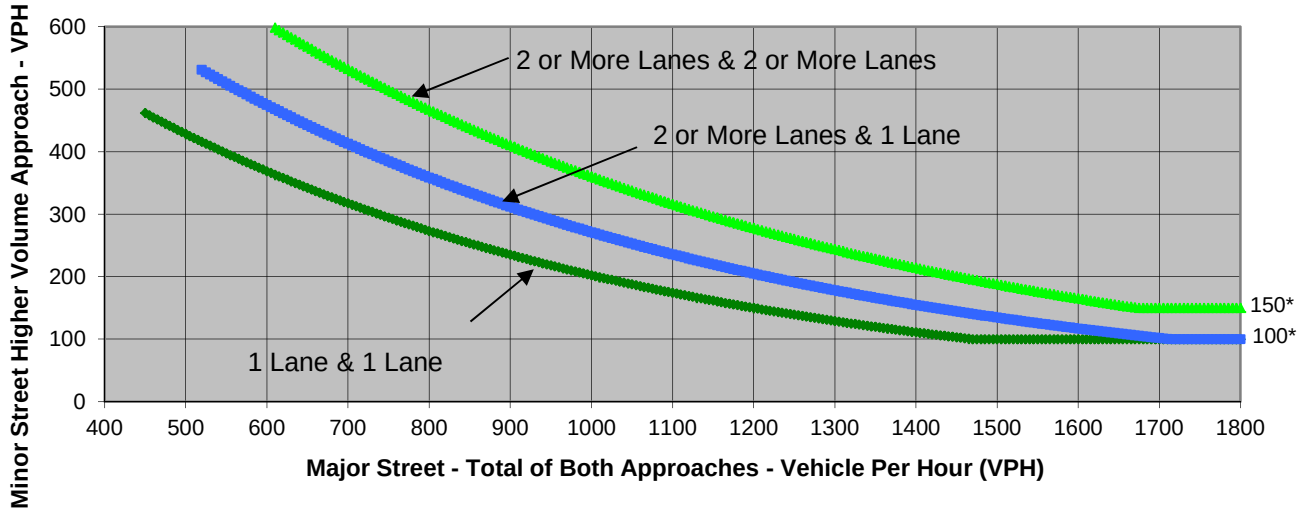
Major Street	Union Road	Project	Oakwood Landing
Minor Street	Woodward Avenue	Scenario	Existing Conditions
		Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	11	69	37	24
Through	119	103	128	83
Right	22	23	4	116
Total	152	195	169	223

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Union Road	Woodward Avenue	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**347**	**223**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

Major Street	Yosemite Avenue
Minor Street	McKinley Avenue

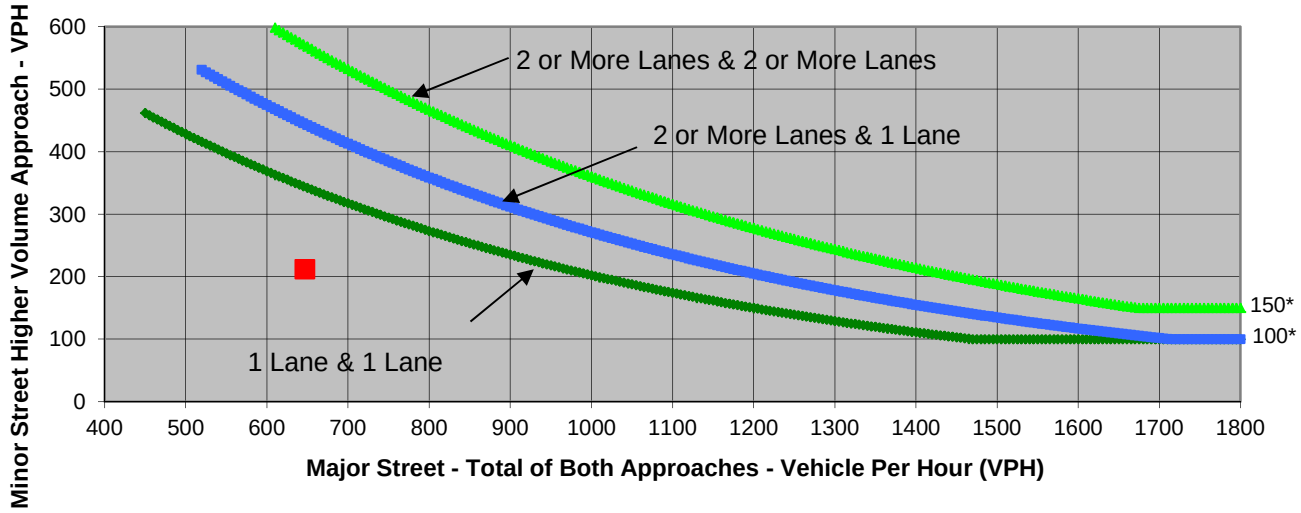
Project	Oakwood Landing
Scenario	Existing Conditions
Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	19	122	42	71
Through	26	66	311	184
Right	20	24	39	0
Total	65	212	392	255

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Yosemite Avenue	McKinley Avenue	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**647**	**212**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

Major Street	McKinley Avenue
Minor Street	Woodward Avenue

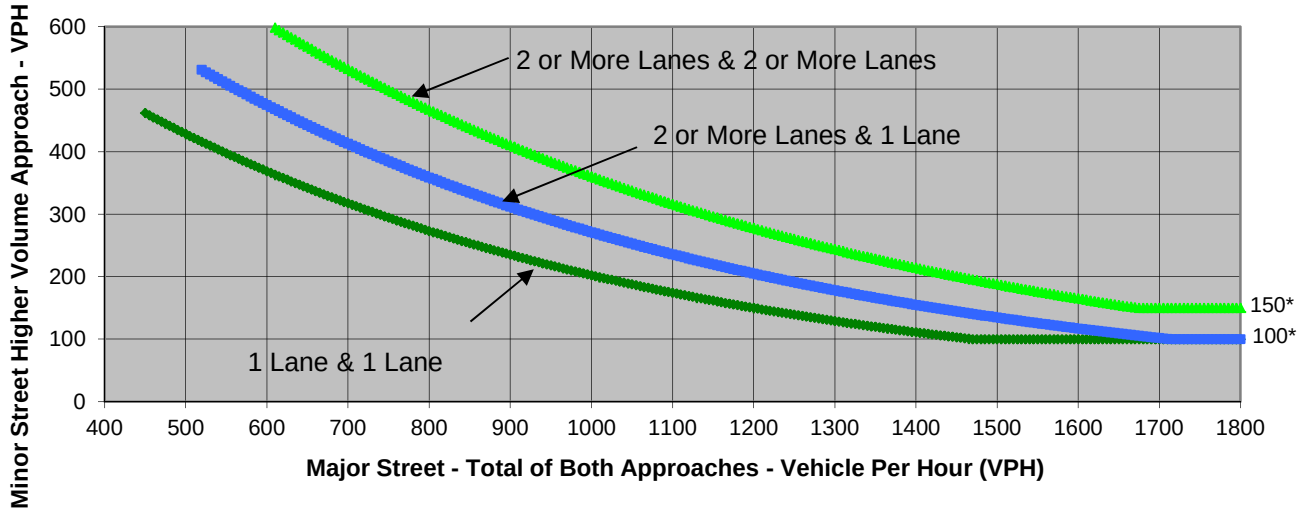
Project	Oakwood Landing
Scenario	Existing Conditions
Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	0	73	38	0
Through	0	0	92	100
Right	0	60	0	32
Total	0	133	130	132

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	McKinley Avenue	Woodward Avenue	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**262**	**133**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

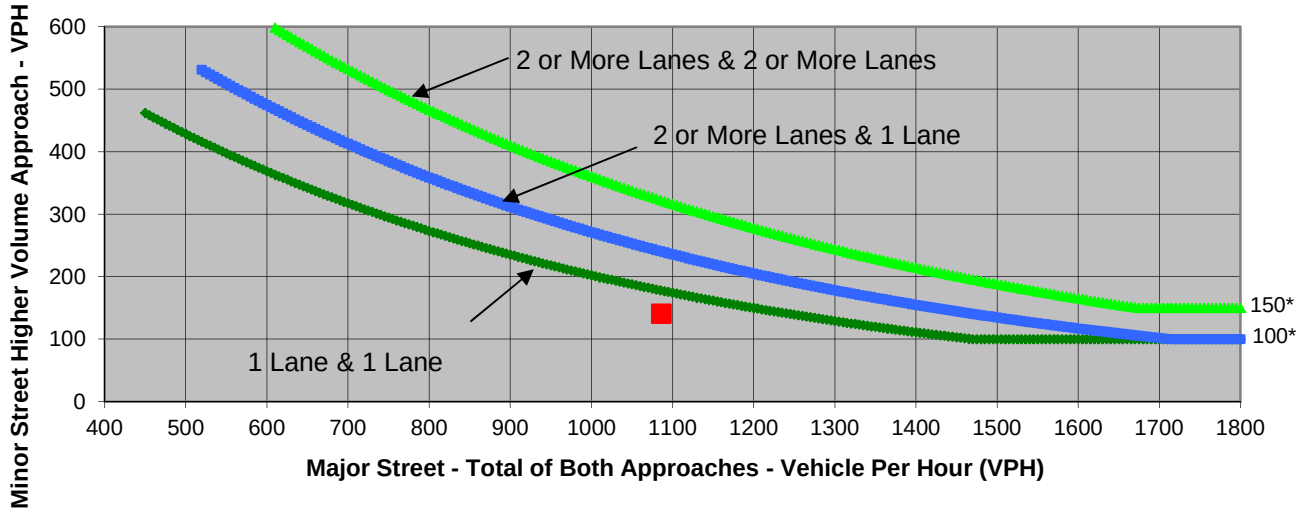
Major Street	Airport Way	Project	Oakwood Landing
Minor Street	Atherton Drive	Scenario	Existing Conditions
		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	6	93	131	6
Through	271	482	3	6
Right	8	226	7	75
Total	285	801	141	87

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Airport Way	Atherton Drive	
Number of Approach Lanes	**2**	**2**	**NO**
Traffic Volume (VPH) *	**1,086**	**141**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

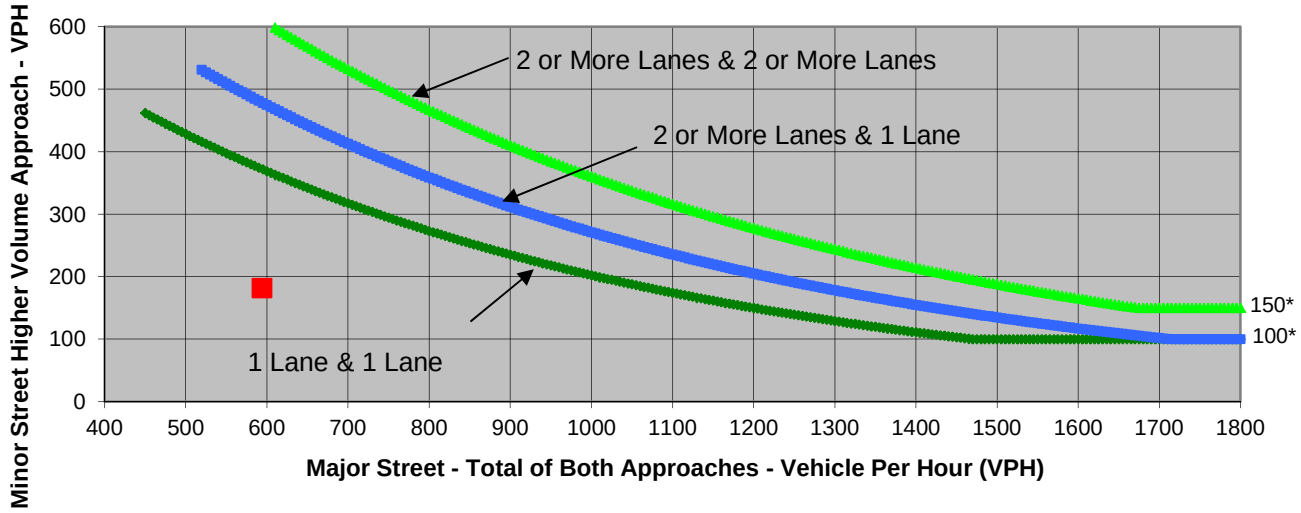
Major Street	Airport Way	Project	Oakwood Landing
Minor Street	Woodward Avenue	Scenario	Existing Conditions
		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	32	105	86	15
Through	140	206	46	17
Right	10	101	50	75
Total	182	412	182	107

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Airport Way	Woodward Avenue	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**594**	**182**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

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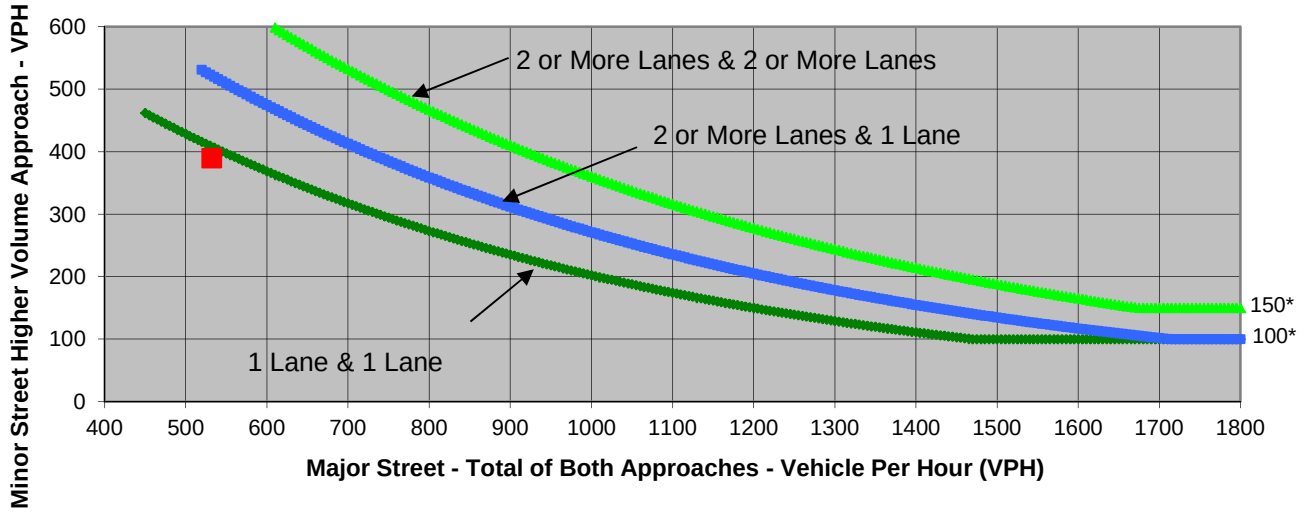
Major Street	Union Road	Project	Oakwood Landing
Minor Street	Woodward Avenue	Scenario	Existing Conditions
		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	4	189	69	16
Through	114	158	307	72
Right	30	37	14	83
Total	148	384	390	171

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Union Road	Woodward Avenue	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**532**	**390**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

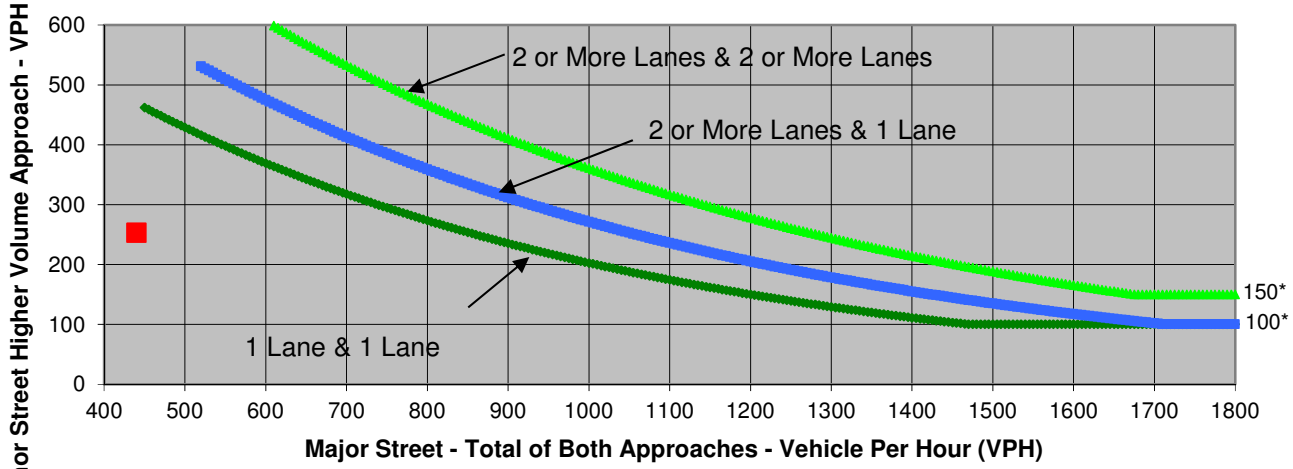
Major Street	Yosemite Avenue	Project	Oakwood Landing
Minor Street	McKinley Avenue	Scenario	Existing Plus Project Conditions
		Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	158	77	18	38
Through	69	42	121	196
Right	26	30	67	0
Total	253	149	206	234

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Yosemite Avenue	McKinley Avenue	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**440**	**253**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

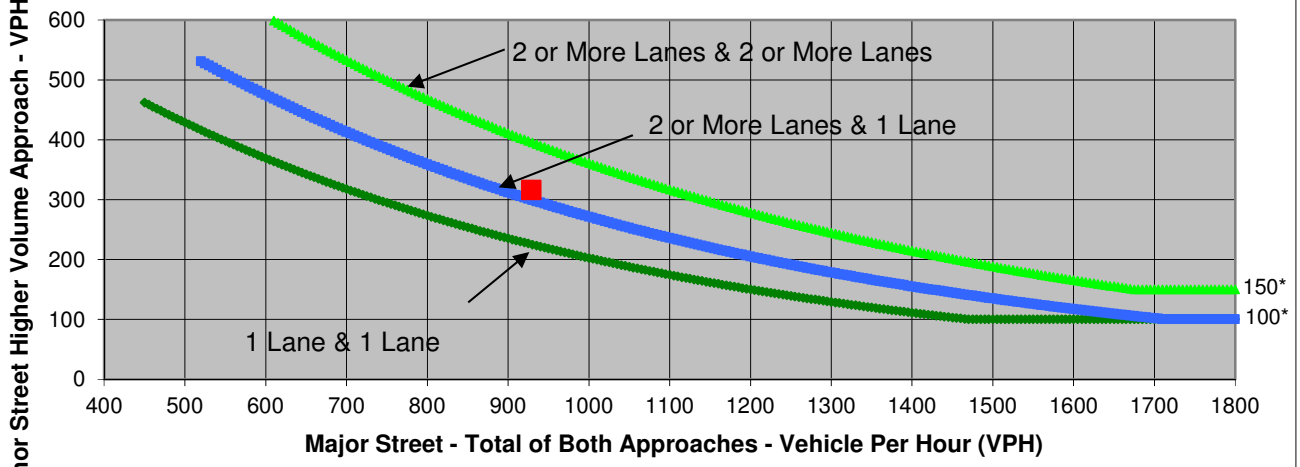
Major Street	Yosemite Avenue	Project	Oakwood Landing
Minor Street	McKinley Avenue	Scenario	Existing Plus Project Conditions
		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	230	122	42	111
Through	64	116	311	184
Right	22	24	281	0
Total	316	262	634	295

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Yosemite Avenue	McKinley Avenue	
Number of Approach Lanes	**1**	**1**	**YES**
Traffic Volume (VPH) *	**929**	**316**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

Major Street	McKinley Avenue
Minor Street	Woodward Avenue

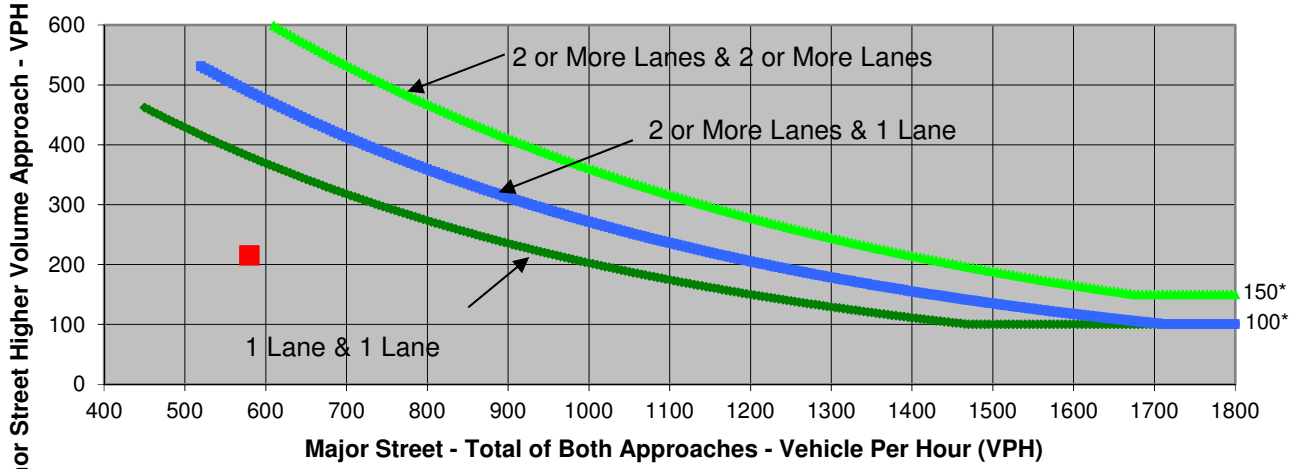
Project	Oakwood Landing
Scenario	Existing Plus Project Conditions
Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	0	52	135	11
Through	47	14	236	115
Right	35	149	0	83
Total	82	215	371	209

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	McKinley Avenue	Woodward Avenue	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**580**	**215**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

Major Street	McKinley Avenue
Minor Street	Woodward Avenue

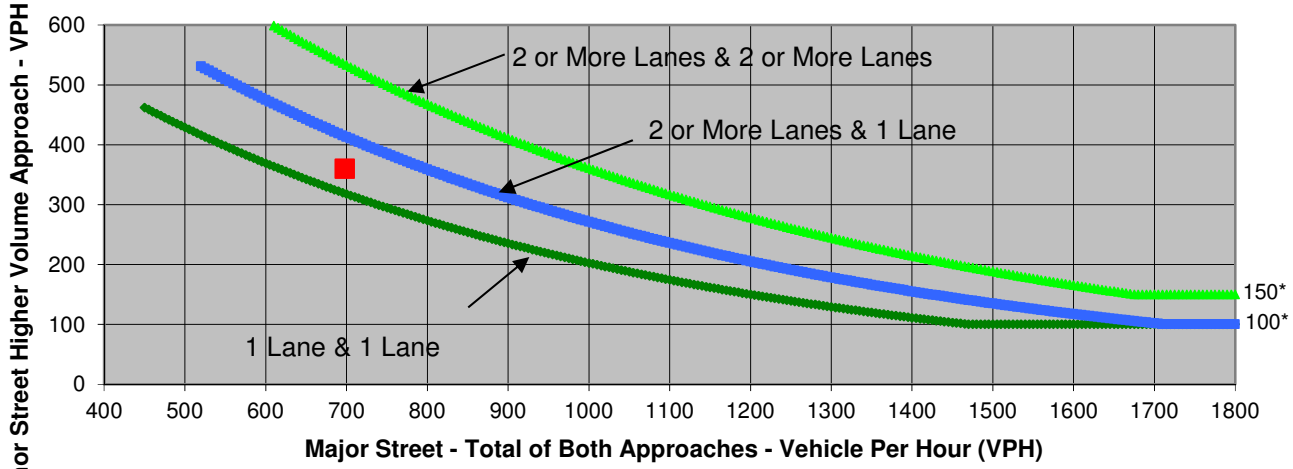
Project	Oakwood Landing
Scenario	Existing Plus Project Conditions
Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	0	165	95	57
Through	33	54	145	281
Right	21	141	1	119
Total	54	360	241	457

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	McKinley Avenue	Woodward Avenue	
Number of Approach Lanes	**1**	**1**	**YES**
Traffic Volume (VPH) *	**698**	**360**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

Major Street	Airport Way
Minor Street	Atherton Drive

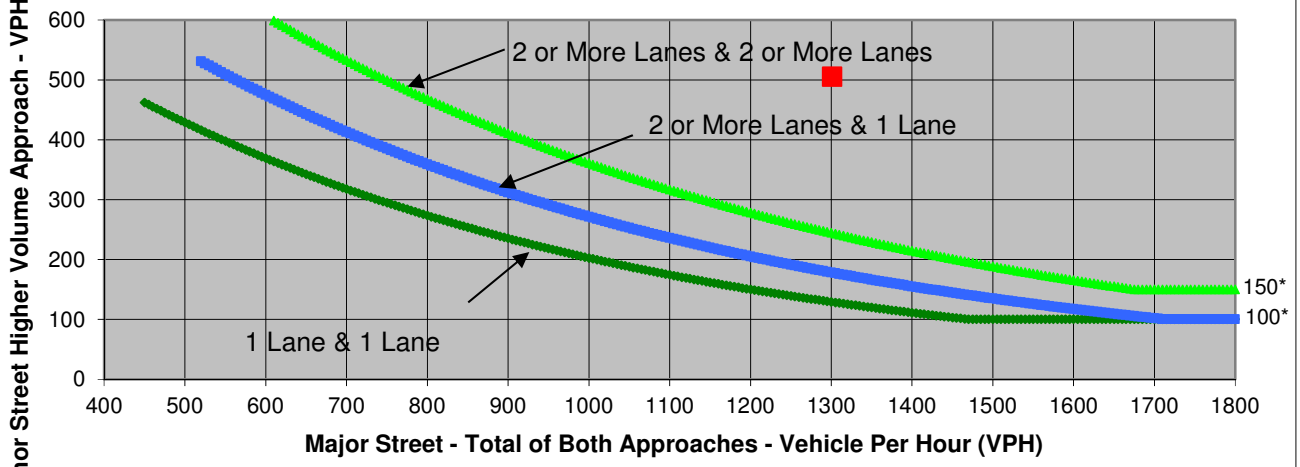
Project	Oakwood Landing
Scenario	Existing Plus Project Conditions
Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	21	50	437	6
Through	651	335	2	1
Right	4	240	66	91
Total	676	625	505	98

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Airport Way	Atherton Drive	
Number of Approach Lanes	**2**	**2**	**YES**
Traffic Volume (VPH) *	**1,301**	**505**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

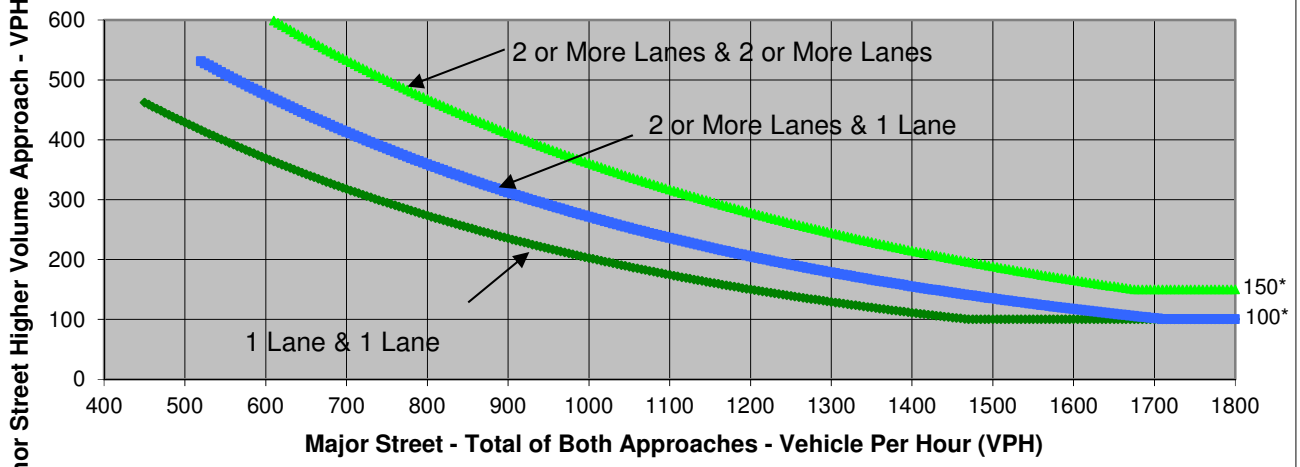
Major Street	Airport Way	Project	Oakwood Landing
Minor Street	Atherton Drive	Scenario	Existing Plus Project Conditions
		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	47	93	432	6
Through	408	721	6	9
Right	8	584	81	75
Total	463	1,398	519	90

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Airport Way	Atherton Drive	
Number of Approach Lanes	**2**	**2**	**YES**
Traffic Volume (VPH) *	**1,861**	**519**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

Major Street	Airport Way
Minor Street	Woodward Avenue

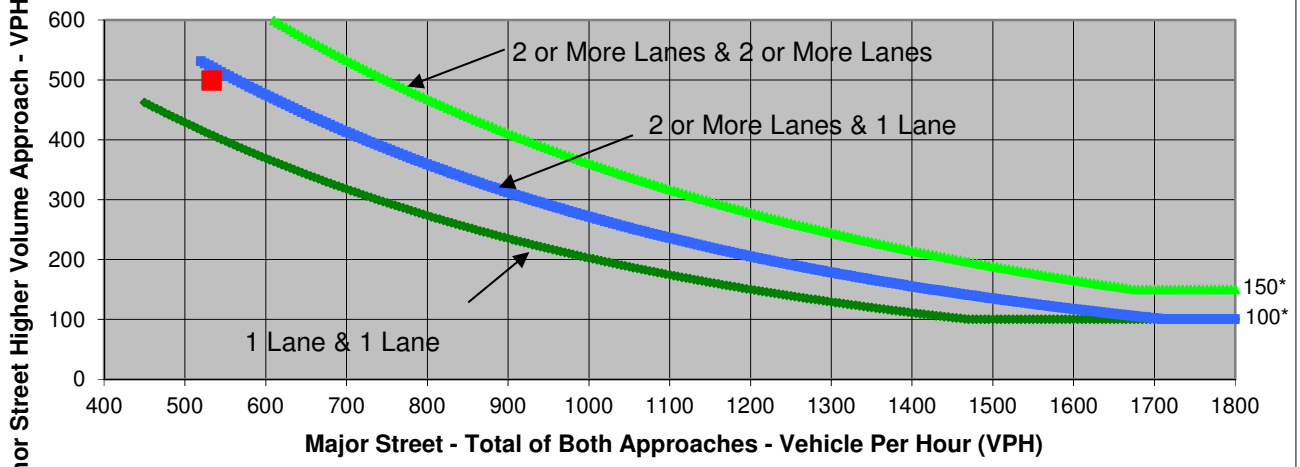
Project	Oakwood Landing
Scenario	Existing Plus Project Conditions
Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	58	78	369	3
Through	147	117	58	30
Right	6	127	72	87
Total	211	322	499	120

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Airport Way	Woodward Avenue	
Number of Approach Lanes	**1**	**1**	**YES**
Traffic Volume (VPH) *	**533**	**499**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

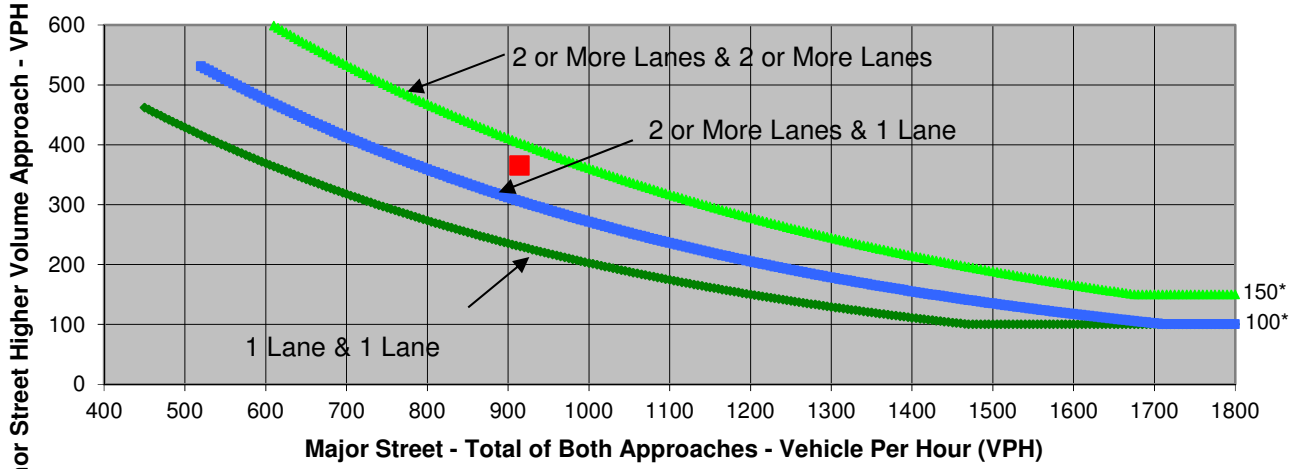
Project	Oakwood Landing
Scenario	Existing Plus Project Conditions
Peak Hour	PM
Major Street	Airport Way
Minor Street	Woodward Avenue

Turn Movement Volumes

	NB	SB	EB	WB
Left	34	174	224	15
Through	145	211	90	83
Right	10	340	51	111
Total	189	725	365	209

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Airport Way	Woodward Avenue	
Number of Approach Lanes	**1**	**1**	**YES**
Traffic Volume (VPH) *	**914**	**365**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

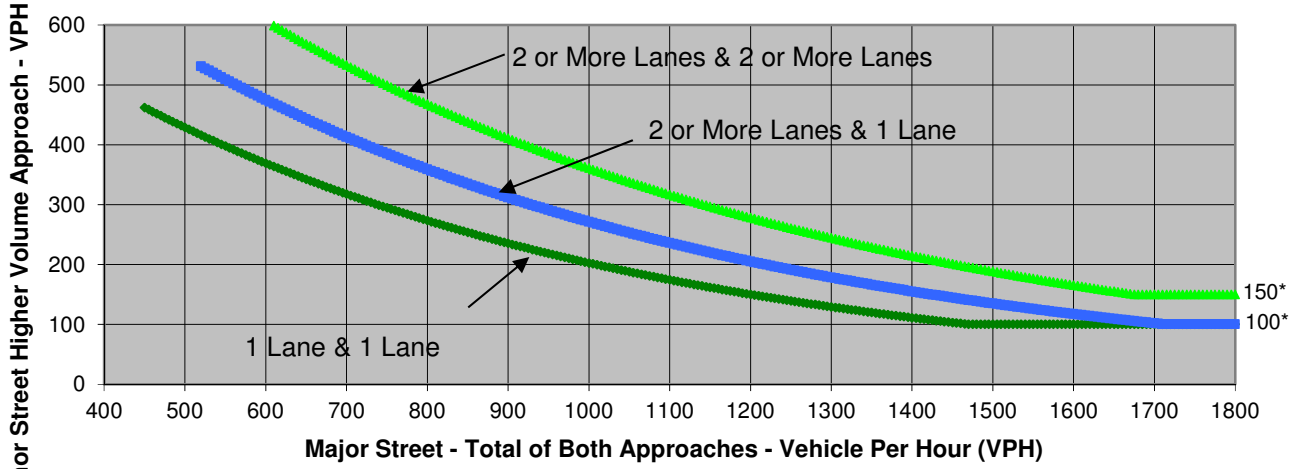
Project	Oakwood Landing
Scenario	Existing Plus Project Conditions
Peak Hour	AM
Major Street	Union Road
Minor Street	Woodward Avenue

Turn Movement Volumes

	NB	SB	EB	WB
Left	11	69	90	24
Through	119	103	153	92
Right	22	48	4	116
Total	152	220	247	232

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Union Road	Woodward Avenue	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**372**	**247**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

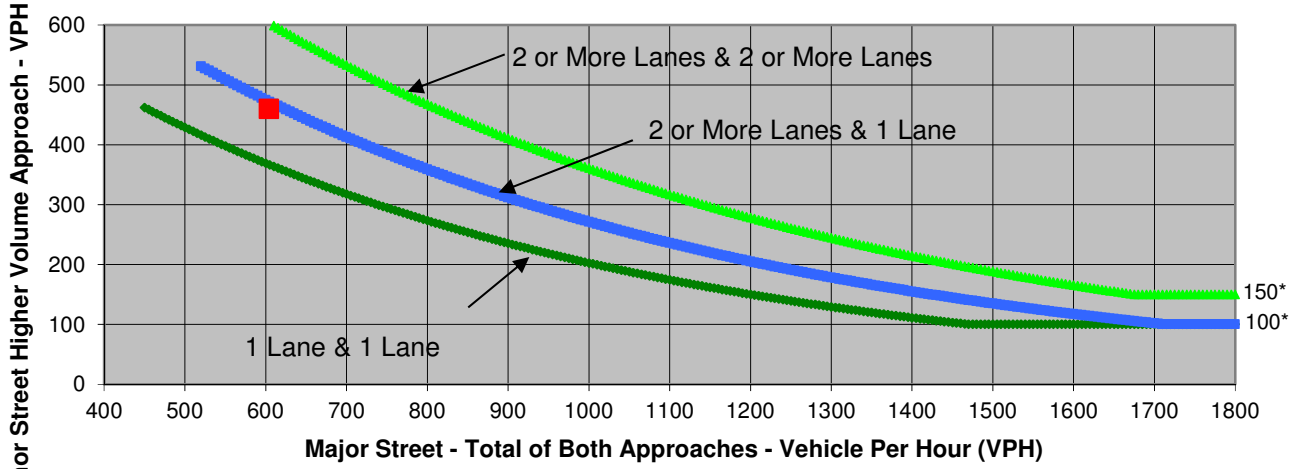
Project	Oakwood Landing
Scenario	Existing Plus Project Conditions
Peak Hour	PM
Major Street	Union Road
Minor Street	Woodward Avenue

Turn Movement Volumes

	NB	SB	EB	WB
Left	4	189	121	16
Through	114	158	325	100
Right	30	109	14	83
Total	148	456	460	199

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Union Road	Woodward Avenue	
Number of Approach Lanes	**1**	**1**	**YES**
Traffic Volume (VPH) *	**604**	**460**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

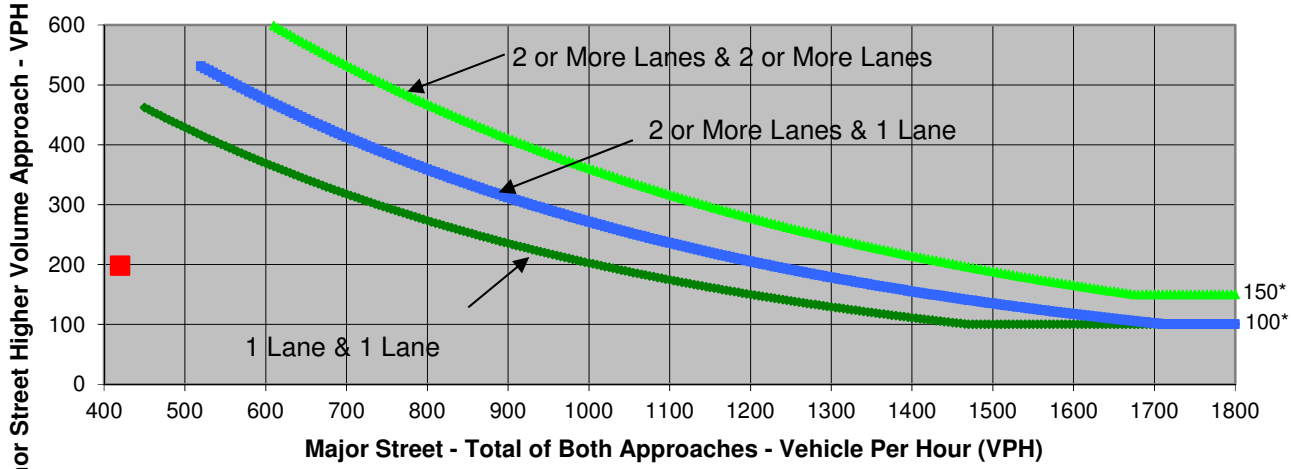
Project	Oakwood Landing
Scenario	Existing Plus Project Conditions
Peak Hour	AM
Major Street	McKinley Avenue
Minor Street	Atherton Drive

Turn Movement Volumes

	NB	SB	EB	WB
Left	0	45	47	83
Through	145	58	101	34
Right	160	12	50	32
Total	305	115	198	149

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	McKinley Avenue	Atherton Drive	
Number of Approach Lanes	**2**	**1**	**NO**
Traffic Volume (VPH) *	**420**	**198**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

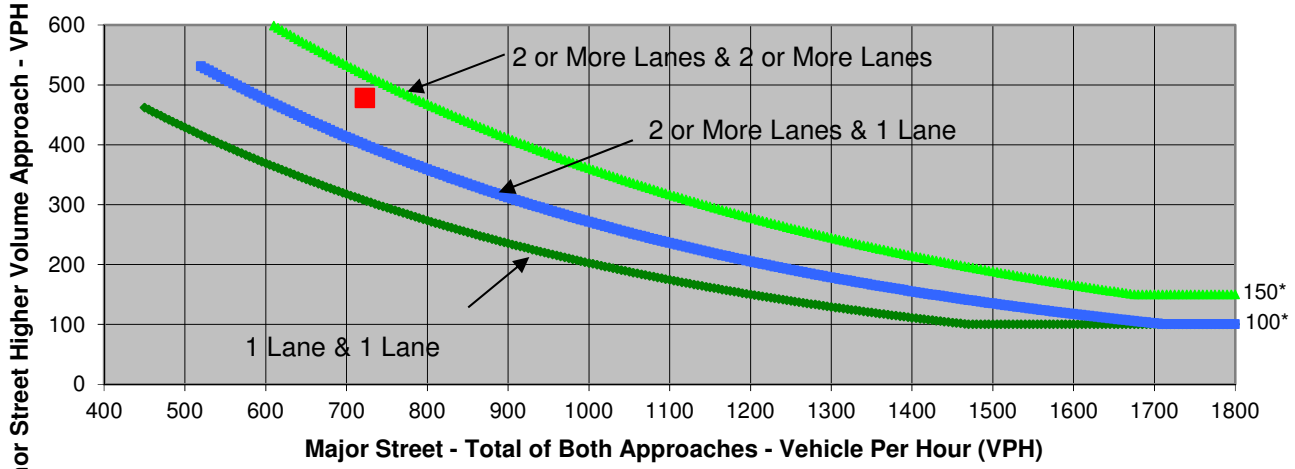
Major Street	McKinley Avenue	Project	Oakwood Landing
Minor Street	Atherton Drive	Scenario	Existing Plus Project Conditions
		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	0	213	26	163
Through	107	185	75	118
Right	178	40	24	197
Total	285	438	125	478

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	McKinley Avenue	Atherton Drive	
Number of Approach Lanes	**2**	**1**	**YES**
Traffic Volume (VPH) *	**723**	**478**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

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Major Street	Woodward Avenue
Minor Street	Atherton Drive

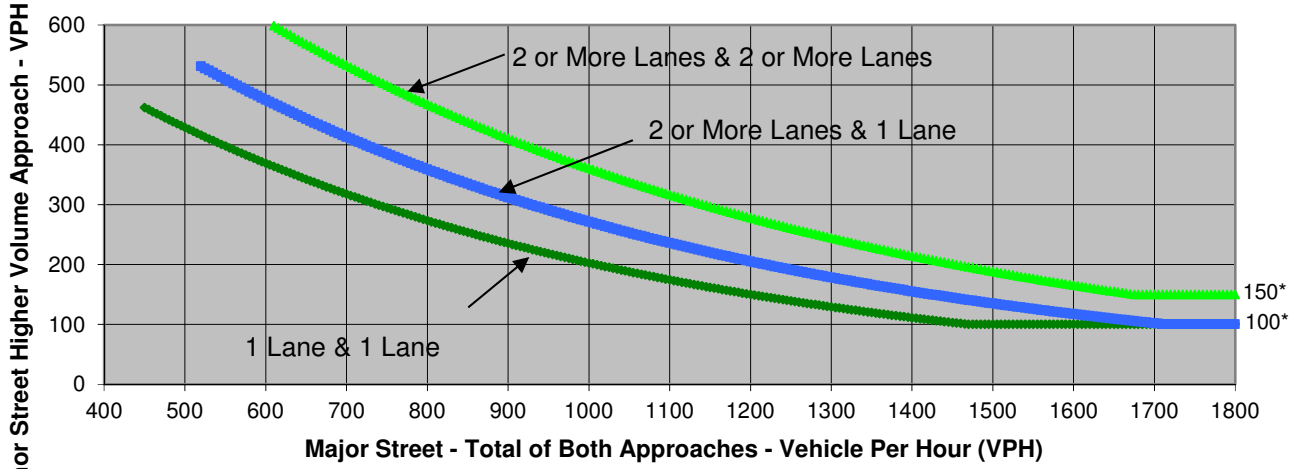
Project	Oakwood Landing
Scenario	Existing Plus Project Conditions
Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	1	1	1	17
Through	72	25	163	87
Right	54	3	0	20
Total	127	29	164	124

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Woodward Avenue	Atherton Drive	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**288**	**127**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

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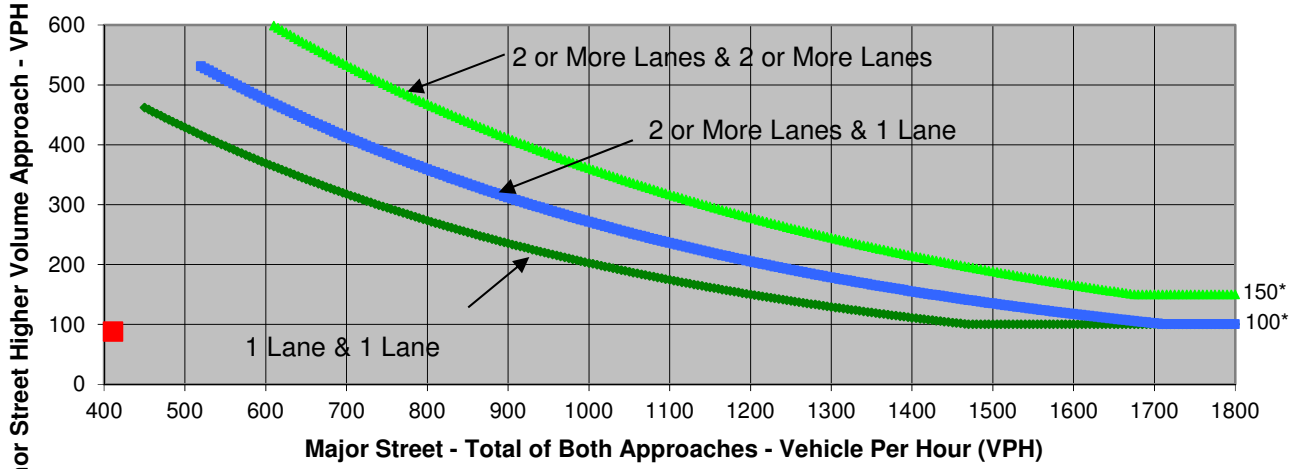
Major Street	Woodward Avenue	Project	Oakwood Landing
Minor Street	Atherton Drive	Scenario	Existing Plus Project Conditions
		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	0	3	4	58
Through	51	83	132	161
Right	33	2	1	55
Total	84	88	137	274

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Woodward Avenue	Atherton Drive	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**411**	**88**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

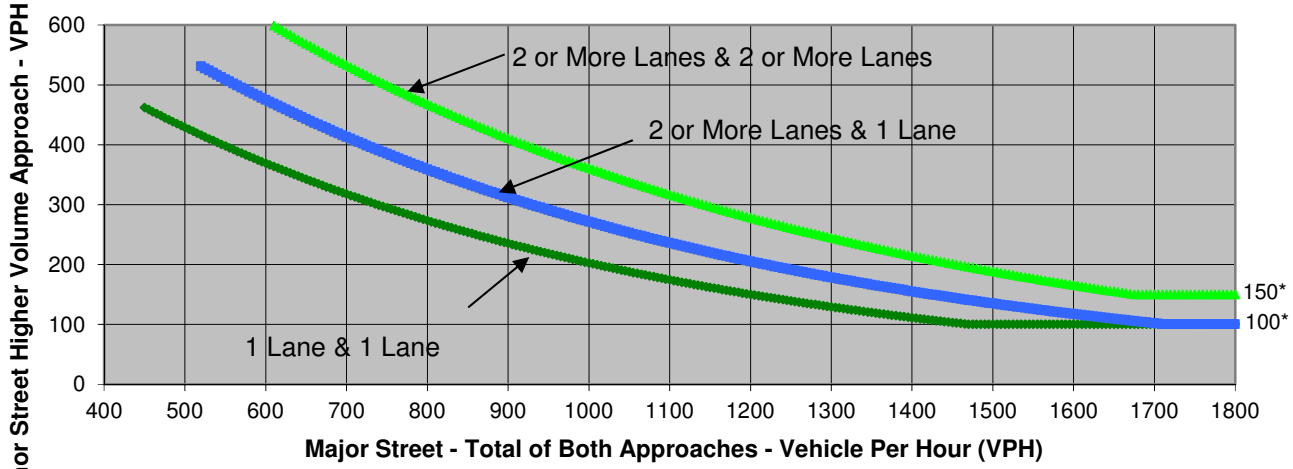
Major Street	Atherton Drive	Project	Oakwood Landing
Minor Street	Multi-Family Driveway	Scenario	Existing Plus Project Conditions
		Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	1	0	0	18
Through	0	0	81	28
Right	117	0	12	0
Total	118	0	93	46

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Atherton Drive	Multi-Family Driveway	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**139**	**118**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

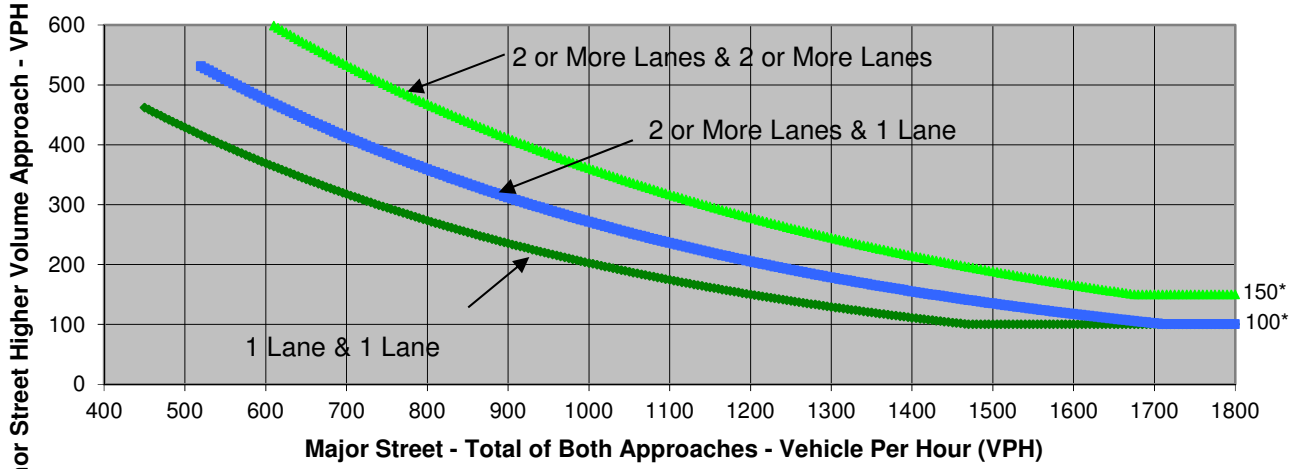
Major Street	Atherton Drive	Project	Oakwood Landing
Minor Street	Multi-Family Driveway	Scenario	Existing Plus Project Conditions
		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	0	0	0	68
Through	0	0	61	88
Right	63	1	49	2
Total	63	1	110	158

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Atherton Drive	Multi-Family Driveway	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**268**	**63**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

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Major Street	Atherton Drive
Minor Street	Dutch Harbor Way

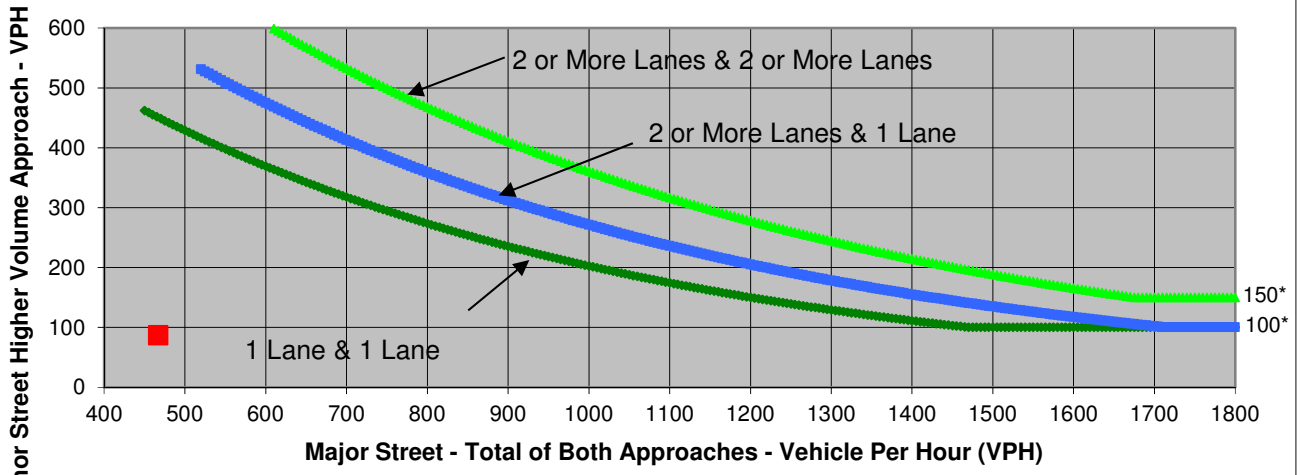
Project	Oakwood Landing
Scenario	Existing Plus Project Conditions
Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	49	56	67	17
Through	1	1	224	70
Right	32	30	15	74
Total	82	87	306	161

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Atherton Drive	Dutch Harbor Way	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**467**	**87**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

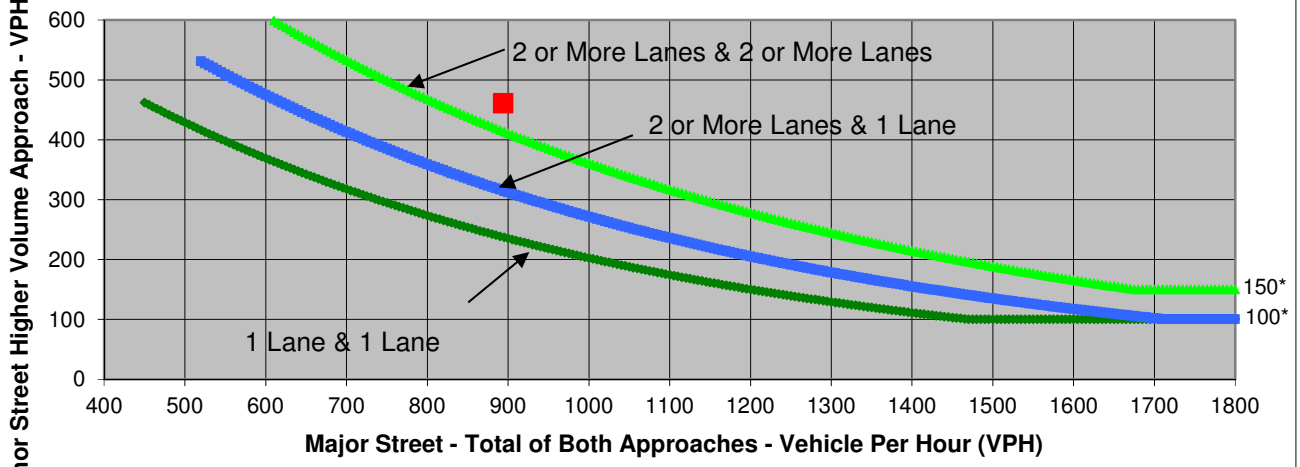
Major Street	Atherton Drive	Project	Oakwood Landing
Minor Street	Dutch Harbor Way	Scenario	Existing Plus Project Conditions
		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	29	224	268	60
Through	5	5	146	217
Right	19	232	52	151
Total	53	461	466	428

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Atherton Drive	Dutch Harbor Way	
Number of Approach Lanes	**1**	**1**	**YES**
Traffic Volume (VPH) *	**894**	**461**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

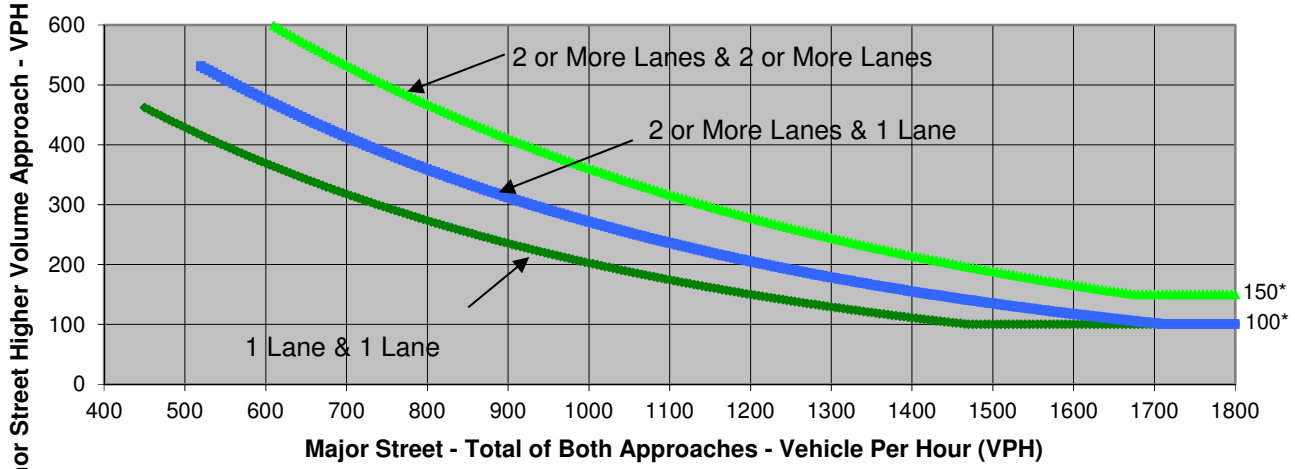
Project	Oakwood Landing
Scenario	Existing Plus Project Conditions
Peak Hour	AM
Major Street	Woodward Avenue
Minor Street	Yukon Avenue

Turn Movement Volumes

	NB	SB	EB	WB
Left	1	32	1	40
Through	0	0	217	115
Right	122	8	0	12
Total	123	40	218	167

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Woodward Avenue	Yukon Avenue	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**385**	**123**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

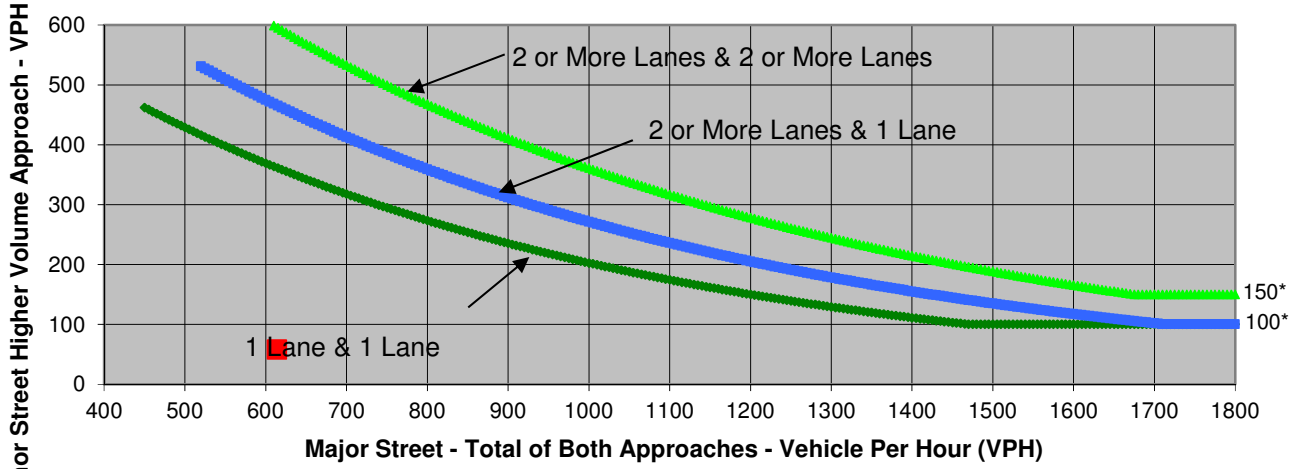
Major Street	Woodward Avenue	Project	Oakwood Landing
Minor Street	Yukon Avenue	Scenario	Existing Plus Project Conditions
		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	0	19	3	138
Through	0	0	164	267
Right	58	7	1	41
Total	58	26	168	446

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Woodward Avenue	Yukon Avenue	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**614**	**58**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

Major Street	McKinley Avenue
Minor Street	Denali Drive

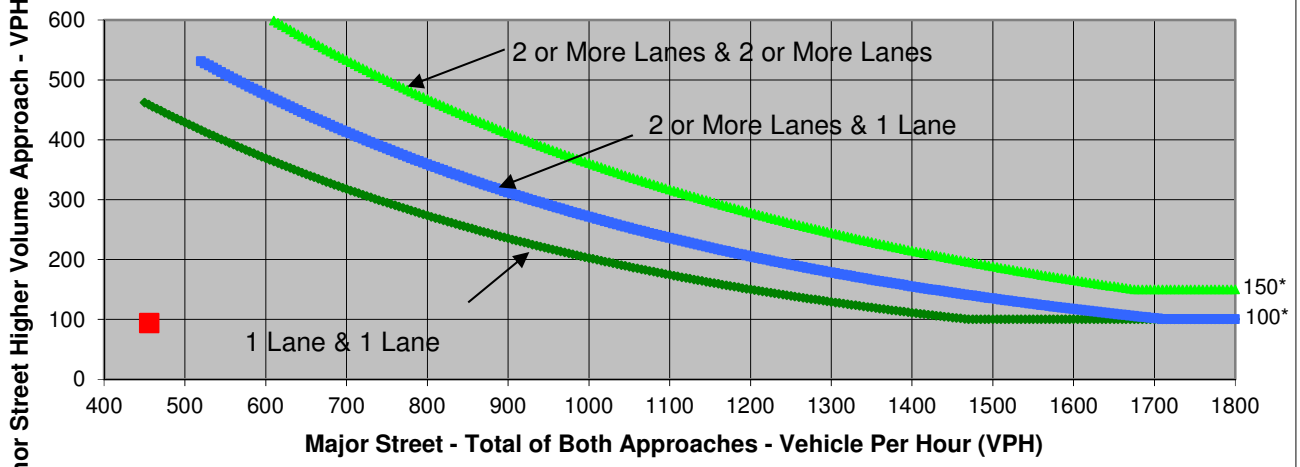
Project	Oakwood Landing
Scenario	Existing Plus Project Conditions
Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	13	0	53	0
Through	252	174	0	0
Right	0	17	41	0
Total	265	191	94	0

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	McKinley Avenue	Denali Drive	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**456**	**94**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

Major Street	McKinley Avenue
Minor Street	Denali Drive

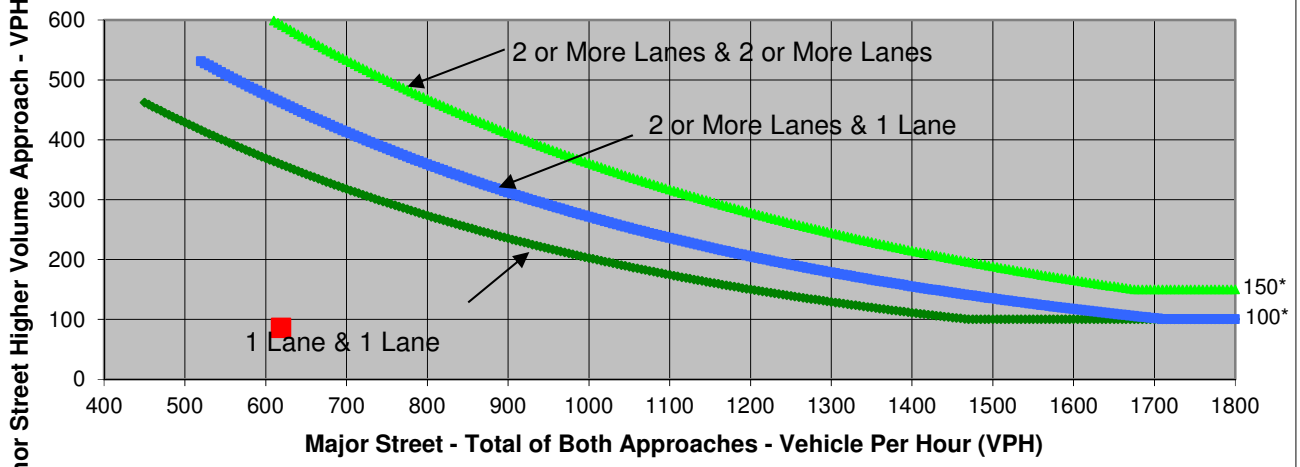
Project	Oakwood Landing
Scenario	Existing Plus Project Conditions
Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	24	0	62	0
Through	223	336	0	0
Right	0	36	24	0
Total	247	372	86	0

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	McKinley Avenue	Denali Drive	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**619**	**86**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

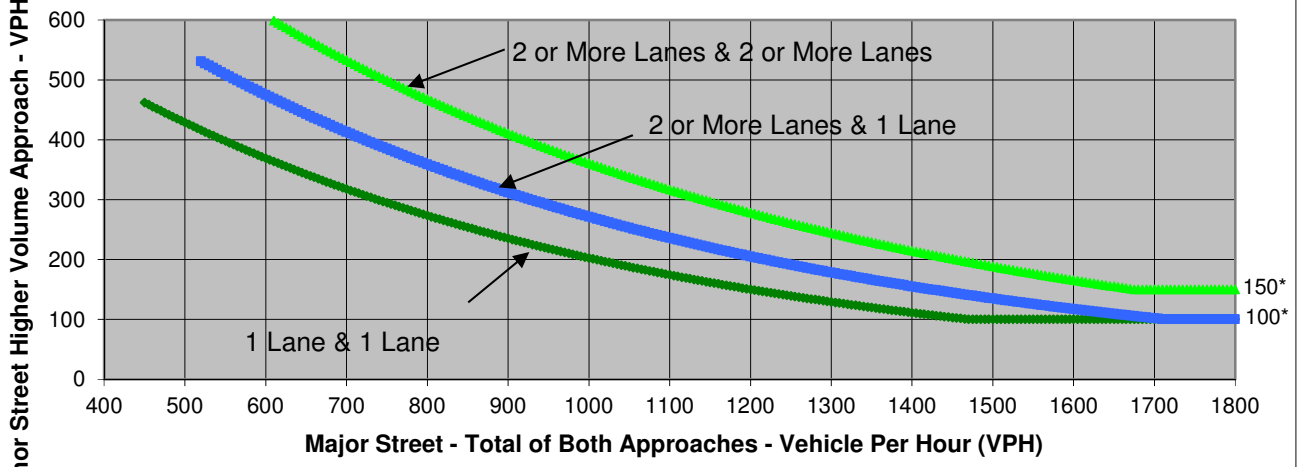
Major Street	McKinley Avenue	Project	Oakwood Landing
Minor Street	Street B	Scenario	Existing Plus Project Conditions
		Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	0	0	82	0
Through	0	0	0	0
Right	0	25	0	0
Total	0	25	82	0

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	McKinley Avenue	Street B	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**25**	**82**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR & PEERS

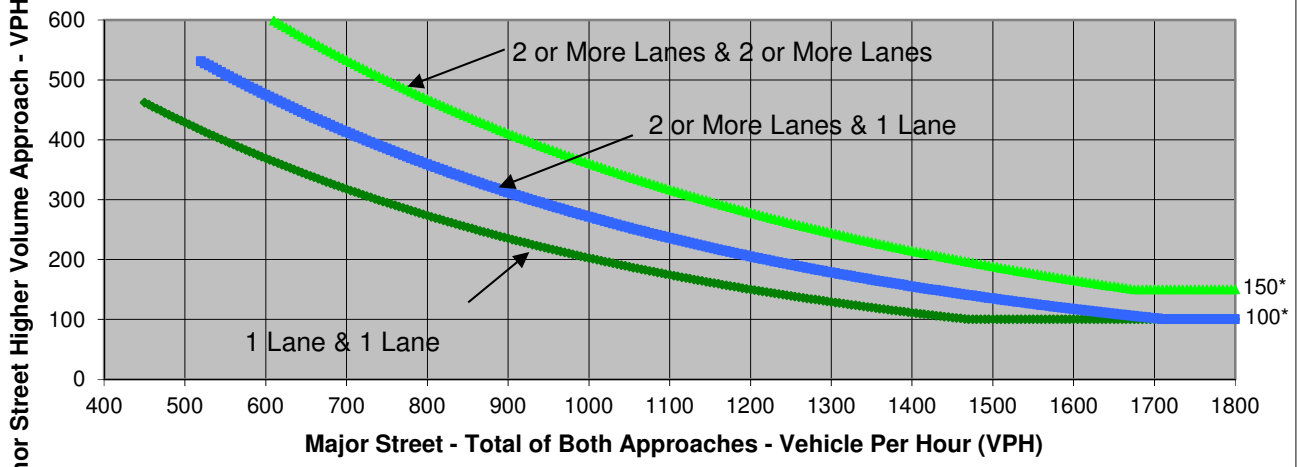
Project	Oakwood Landing
Scenario	Existing Plus Project Conditions
Peak Hour	PM
Major Street	McKinley Avenue
Minor Street	Street B

Turn Movement Volumes

	NB	SB	EB	WB
Left	0	0	54	0
Through	0	0	0	0
Right	0	112	0	0
Total	0	112	54	0

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	McKinley Avenue	Street B	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**112**	**54**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

Major Street	Yosemite Avenue
Minor Street	McKinley Avenue

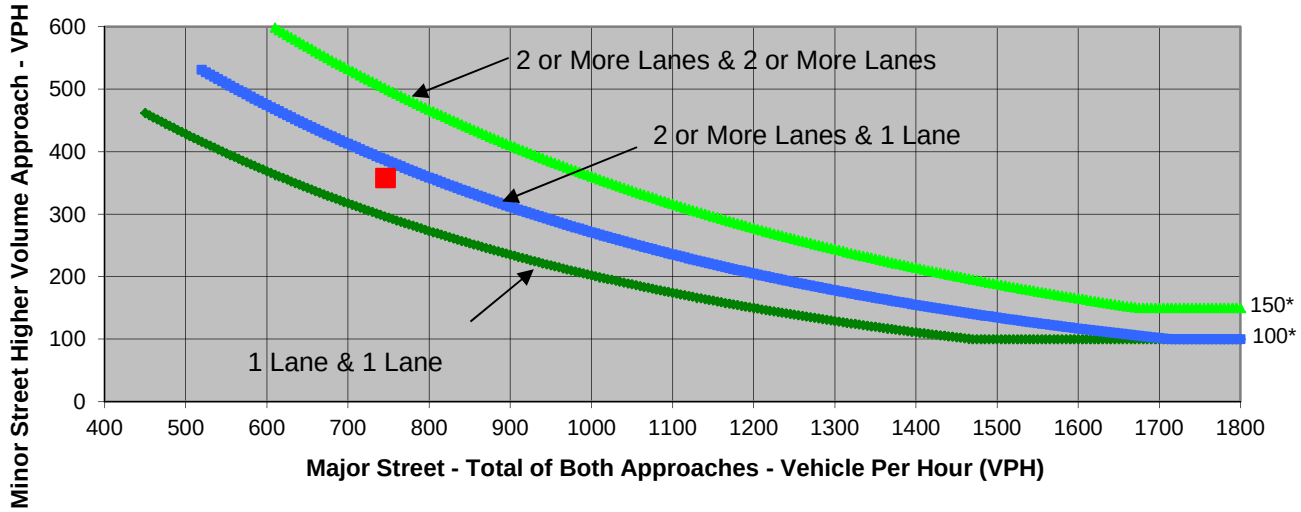
Project	Oakwood Landing
Scenario	Cumulative Plus Project Conditions
Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	70	120	50	116
Through	127	113	160	200
Right	161	40	30	190
Total	358	273	240	506

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Yosemite Avenue	McKinley Avenue	
Number of Approach Lanes	**2**	**1**	**NO**
Traffic Volume (VPH) *	**746**	**358**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

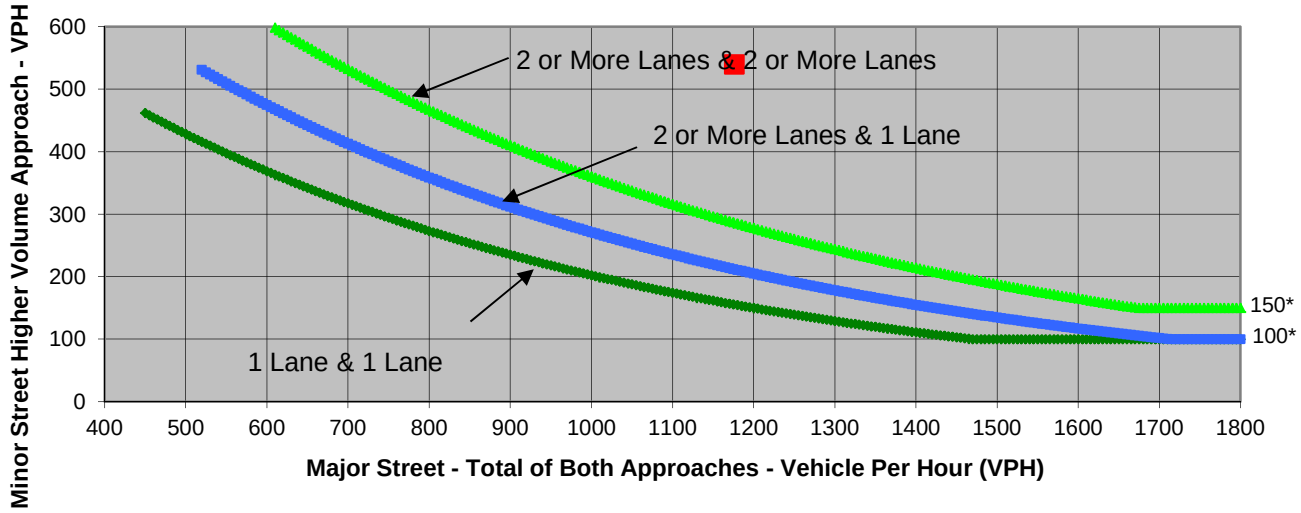
Major Street	Yosemite Avenue	Project	Oakwood Landing
Minor Street	McKinley Avenue	Scenario	Cumulative Plus Project Conditions
		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	30	70	240	257
Through	106	410	299	230
Right	151	60	60	90
Total	287	540	599	577

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Yosemite Avenue	McKinley Avenue	
Number of Approach Lanes	**2**	**1**	**YES**
Traffic Volume (VPH) *	**1,176**	**540**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

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Major Street	McKinley Avenue
Minor Street	Woodward Avenue

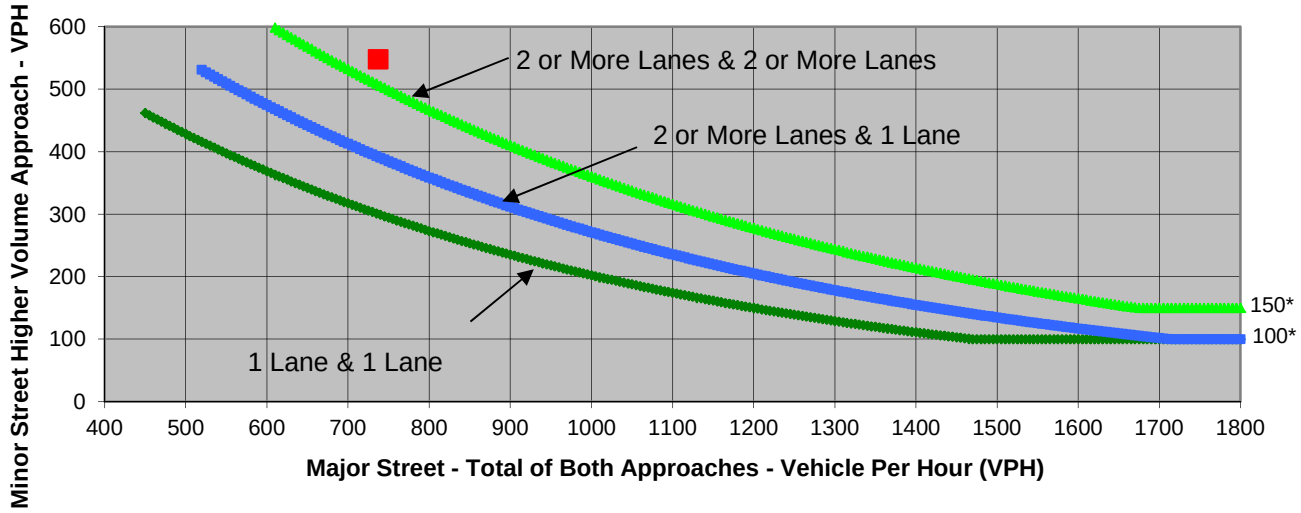
Project	Oakwood Landing
Scenario	Cumulative Plus Project Conditions
Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	4	78	179	44
Through	352	86	180	78
Right	156	61	0	426
Total	512	225	359	548

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	McKinley Avenue	Woodward Avenue	
Number of Approach Lanes	**2**	**1**	**YES**
Traffic Volume (VPH) *	**737**	**548**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

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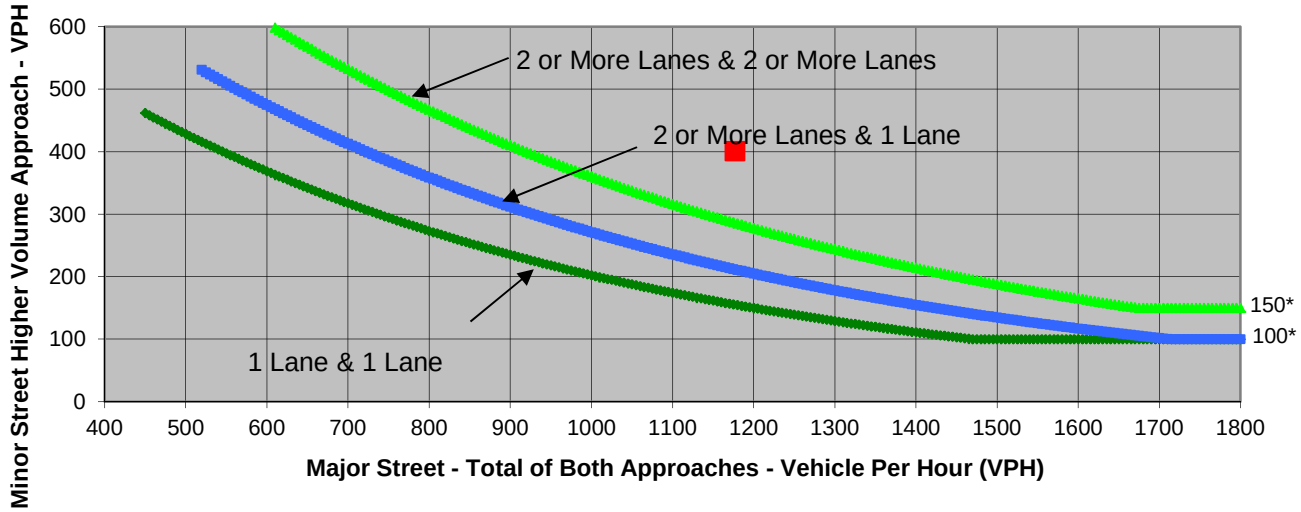
Major Street	McKinley Avenue	Project	Oakwood Landing
Minor Street	Woodward Avenue	Scenario	Cumulative Plus Project Conditions
		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	6	516	122	192
Through	136	431	126	209
Right	88	-	3	-
Total	230	947	251	401

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	McKinley Avenue	Woodward Avenue	
Number of Approach Lanes	**2**	**1**	**YES**
Traffic Volume (VPH) *	**1,177**	**401**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

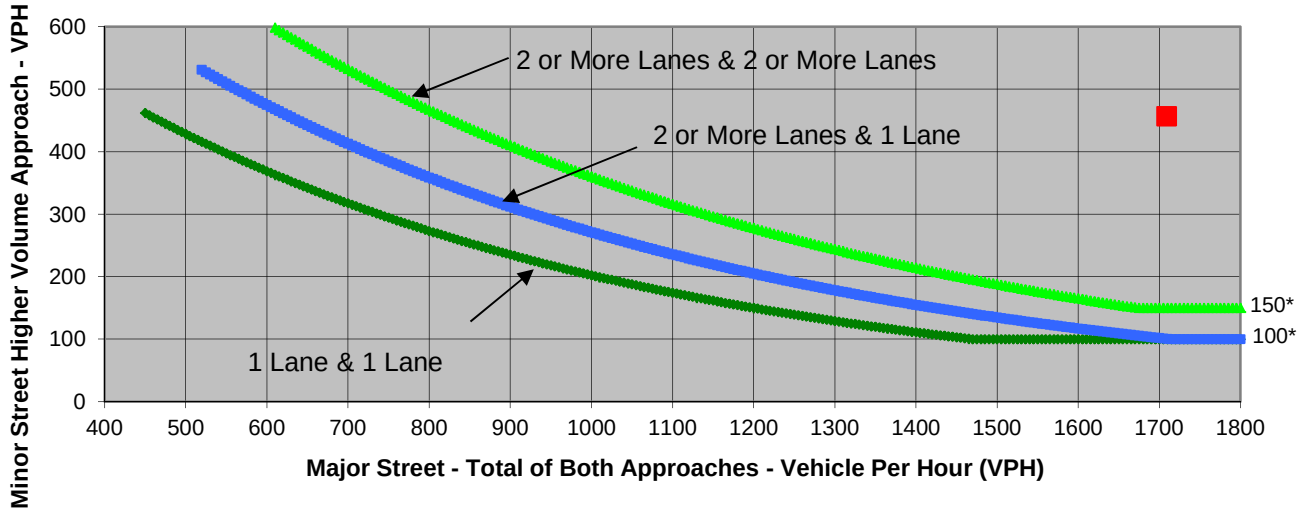
Major Street	Airport Way	Project	Oakwood Landing
Minor Street	Atherton Drive	Scenario	Cumulative Plus Project Conditions
		Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	5	360	331	20
Through	770	350	26	37
Right	30	194	73	400
Total	805	904	430	457

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Airport Way	Atherton Drive	
Number of Approach Lanes	**2**	**2**	**YES**
Traffic Volume (VPH) *	**1,709**	**457**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

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Major Street	Airport Way
Minor Street	Atherton Drive

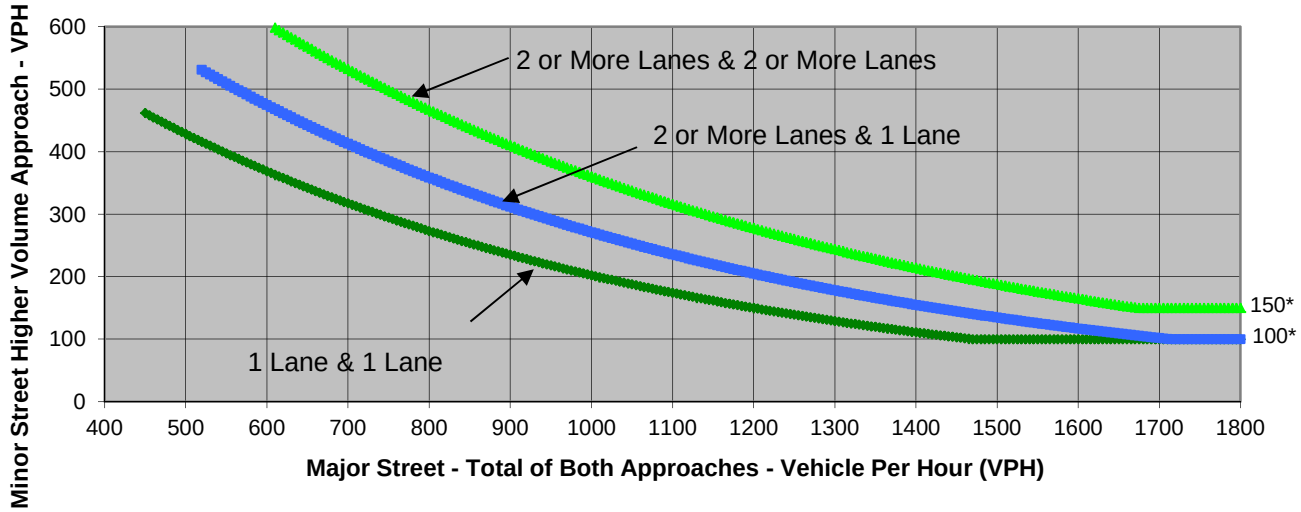
Project	Oakwood Landing
Scenario	Cumulative Plus Project Conditions
Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	40	490	340	50
Through	485	1,030	36	72
Right	30	418	54	430
Total	555	1,938	430	552

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Airport Way	Atherton Drive	
Number of Approach Lanes	**2**	**2**	**YES**
Traffic Volume (VPH) *	**2,493**	**552**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

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Major Street	Airport Way
Minor Street	Woodward Avenue

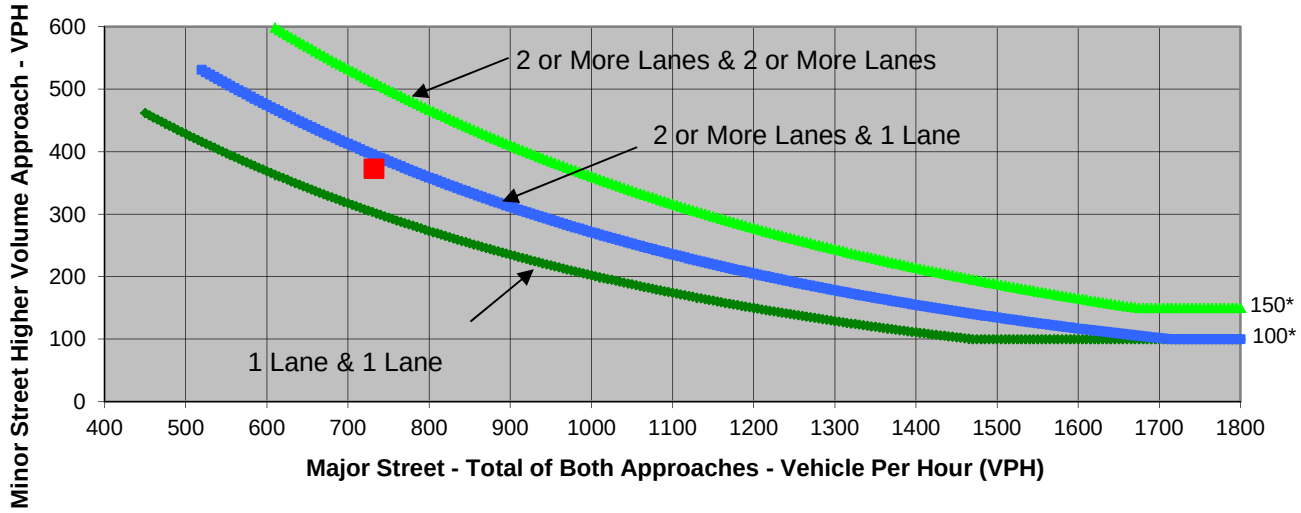
Project	Oakwood Landing
Scenario	Cumulative Plus Project Conditions
Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	70	91	320	10
Through	201	202	41	87
Right	20	80	70	204
Total	291	373	431	301

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Airport Way	Woodward Avenue	
Number of Approach Lanes	**1**	**1**	**YES**
Traffic Volume (VPH) *	**732**	**373**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

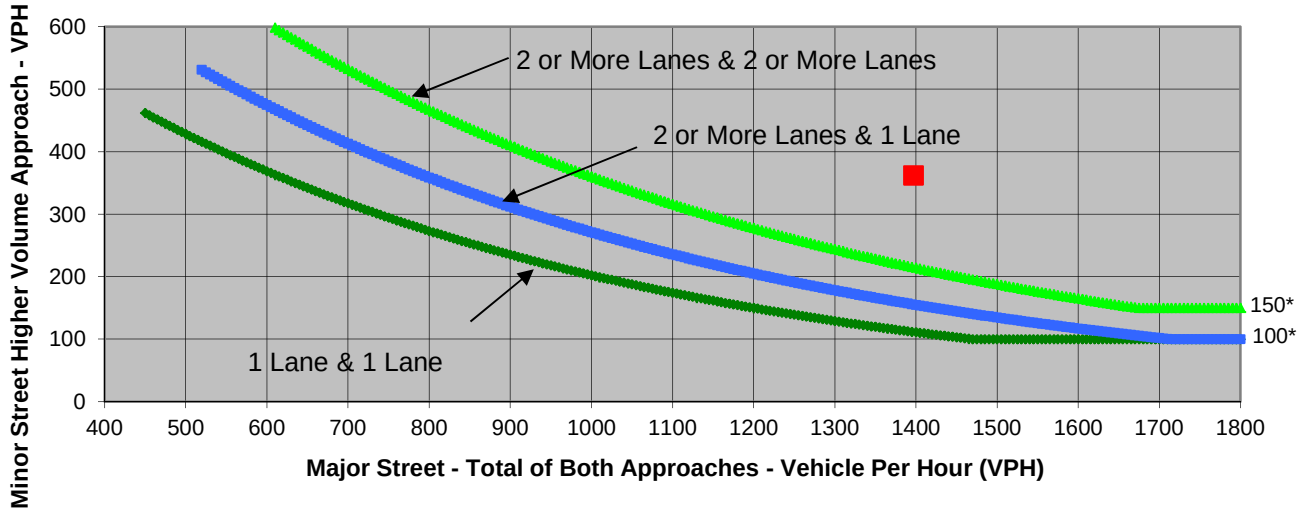
Major Street	Airport Way	Project	Oakwood Landing
Minor Street	Woodward Avenue	Scenario	Cumulative Plus Project Conditions
		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	40	271	135	50
Through	283	493	127	123
Right	20	290	100	157
Total	343	1,054	362	330

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Airport Way	Woodward Avenue	
Number of Approach Lanes	**1**	**1**	**YES**
Traffic Volume (VPH) *	**1,397**	**362**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

Major Street	Union Road
Minor Street	Woodward Avenue

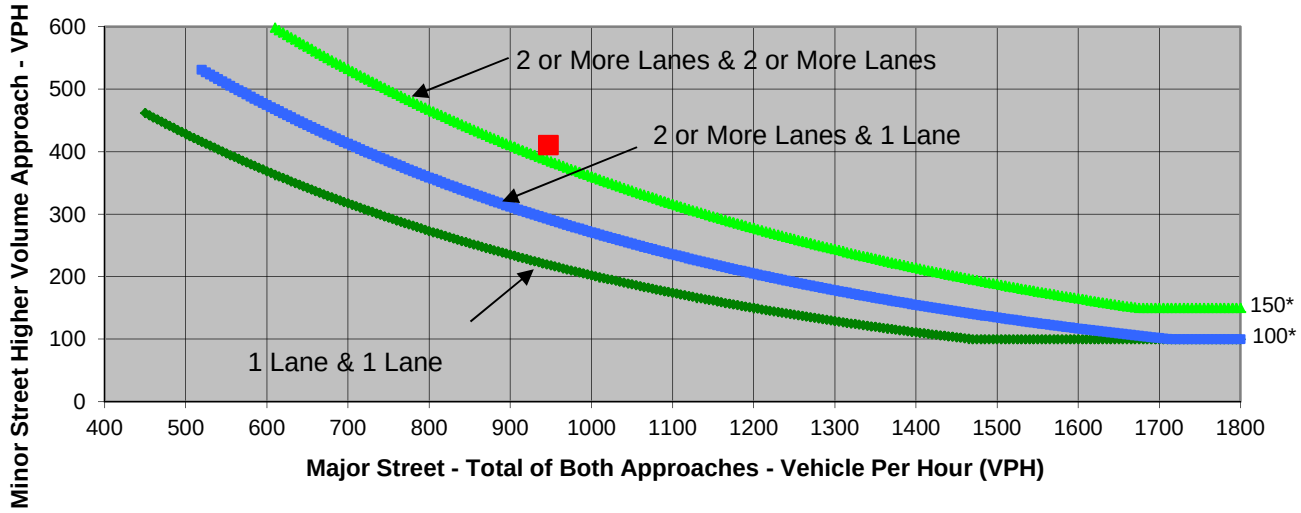
Project	Oakwood Landing
Scenario	Cumulative Plus Project Conditions
Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	31	110	179	20
Through	360	160	161	146
Right	20	89	11	430
Total	411	359	351	596

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Union Road	Woodward Avenue	
Number of Approach Lanes	**2**	**2**	**YES**
Traffic Volume (VPH) *	**947**	**411**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

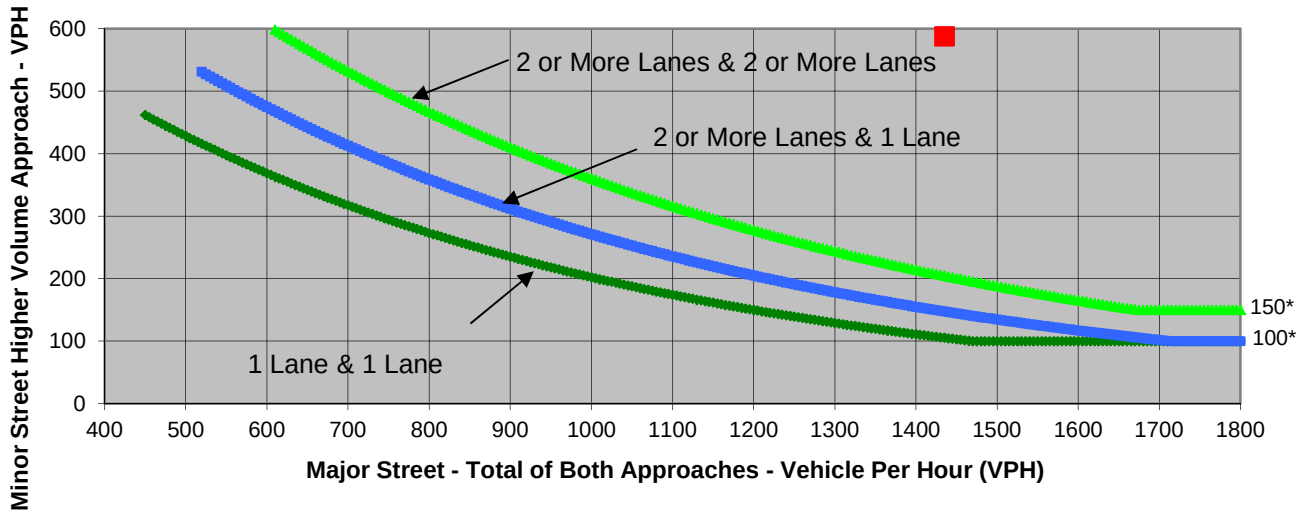
Major Street	Union Road	Project	Oakwood Landing
Minor Street	Woodward Avenue	Scenario	Cumulative Plus Project Conditions
		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	12	390	140	20
Through	200	530	406	150
Right	30	273	42	270
Total	242	1,193	588	440

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Union Road	Woodward Avenue	
Number of Approach Lanes	**2**	**2**	**YES**
Traffic Volume (VPH) *	**1,435**	**588**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

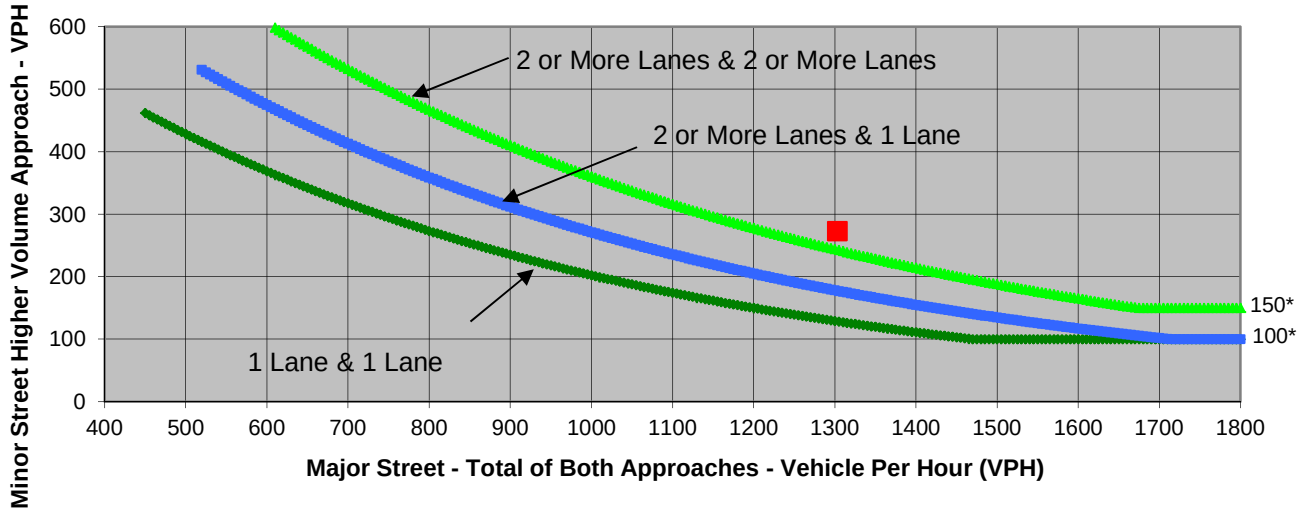
Major Street	Atherton Drive	Project	Oakwood Landing
Minor Street	Multi-Family Driveway	Scenario	Cumulative Plus Project Conditions
		Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	0	273	18	18
Through	0	0	333	104
Right	118	-	12	818
Total	118	273	363	940

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Atherton Drive	Multi-Family Driveway	
Number of Approach Lanes	**2**	**1**	**YES**
Traffic Volume (VPH) *	**1,303**	**273**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

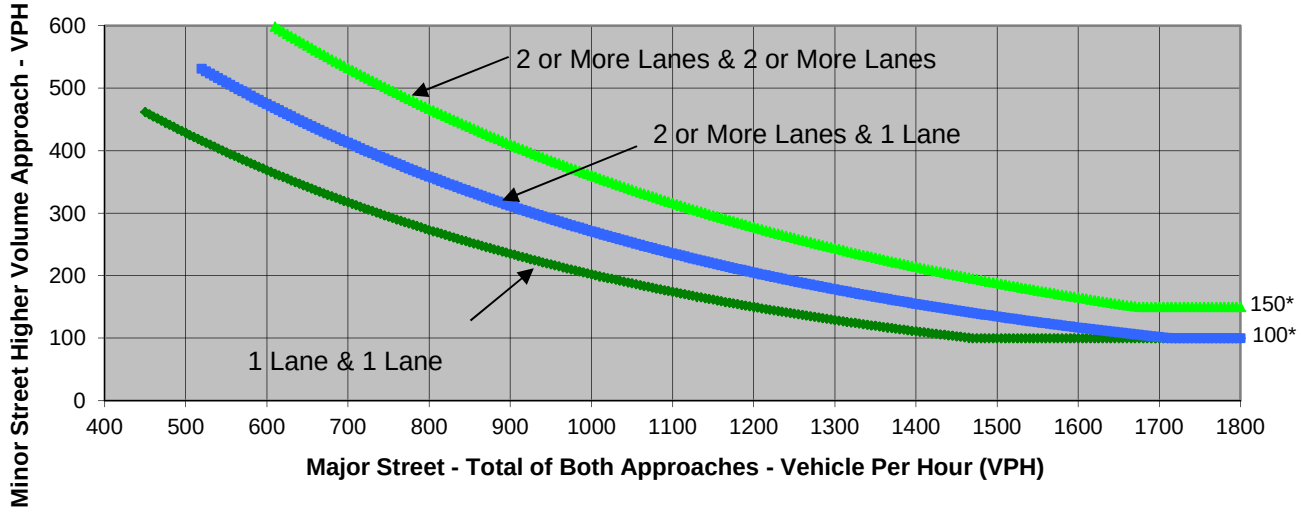
Major Street	Atherton Drive	Project	Oakwood Landing
Minor Street	Multi-Family Driveway	Scenario	Cumulative Plus Project Conditions
		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	11	991	12	91
Through	2	2	239	400
Right	50	12	24	395
Total	63	1,005	275	886

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Atherton Drive	Multi-Family Driveway	
Number of Approach Lanes	**2**	**2**	**YES**
Traffic Volume (VPH) *	**1,161**	**1,005**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

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Major Street	Atherton Drive
Minor Street	Dutch Harbor Way

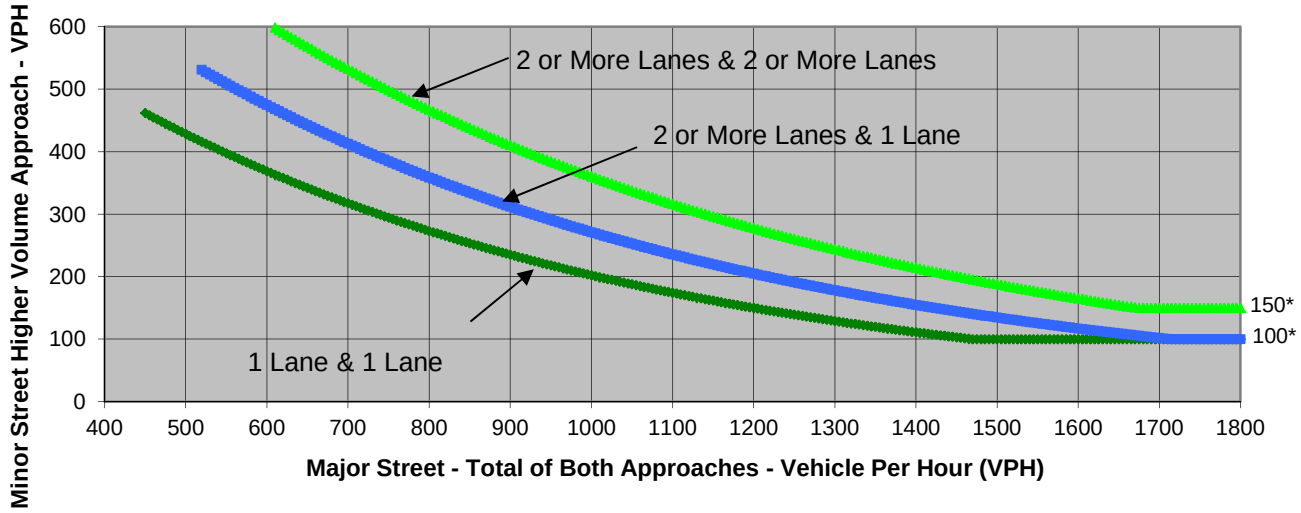
Project	Oakwood Landing
Scenario	Cumulative Plus Project Conditions
Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	53	25	117	10
Through	1	1	116	90
Right	28	61	15	24
Total	82	87	248	124

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Atherton Drive	Dutch Harbor Way	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**372**	**87**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

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Major Street	Atherton Drive
Minor Street	Dutch Harbor Way

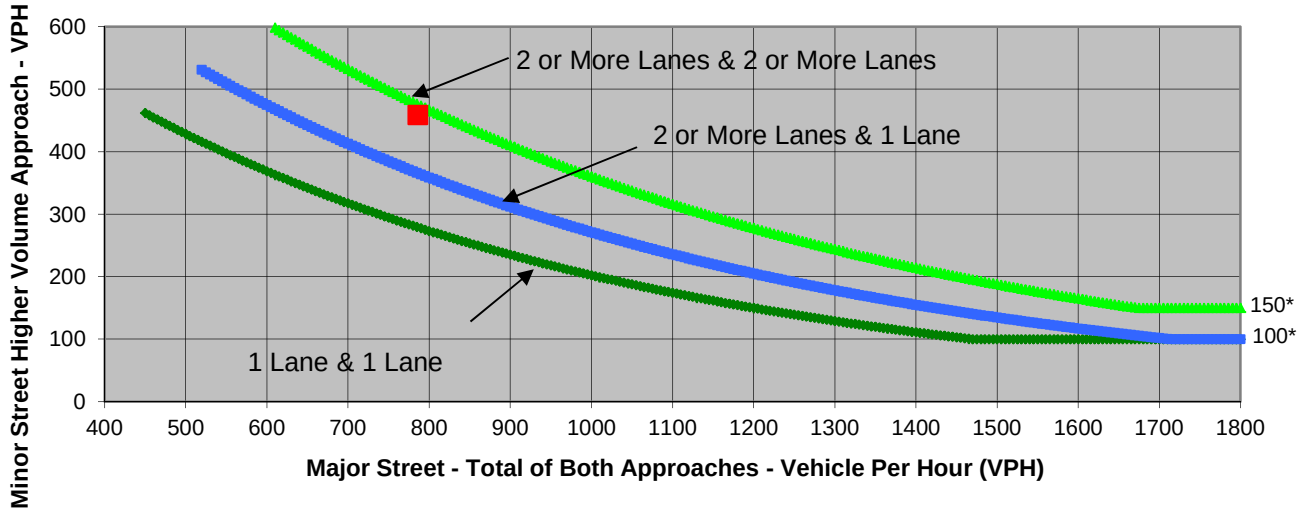
Project	Oakwood Landing
Scenario	Cumulative Plus Project Conditions
Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	29	143	332	46
Through	5	5	133	122
Right	19	311	66	87
Total	53	459	531	255

Major Street Direction

	North/South
x	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	Atherton Drive	Dutch Harbor Way	
Number of Approach Lanes	**2**	**1**	**YES**
Traffic Volume (VPH) *	**786**	**459**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

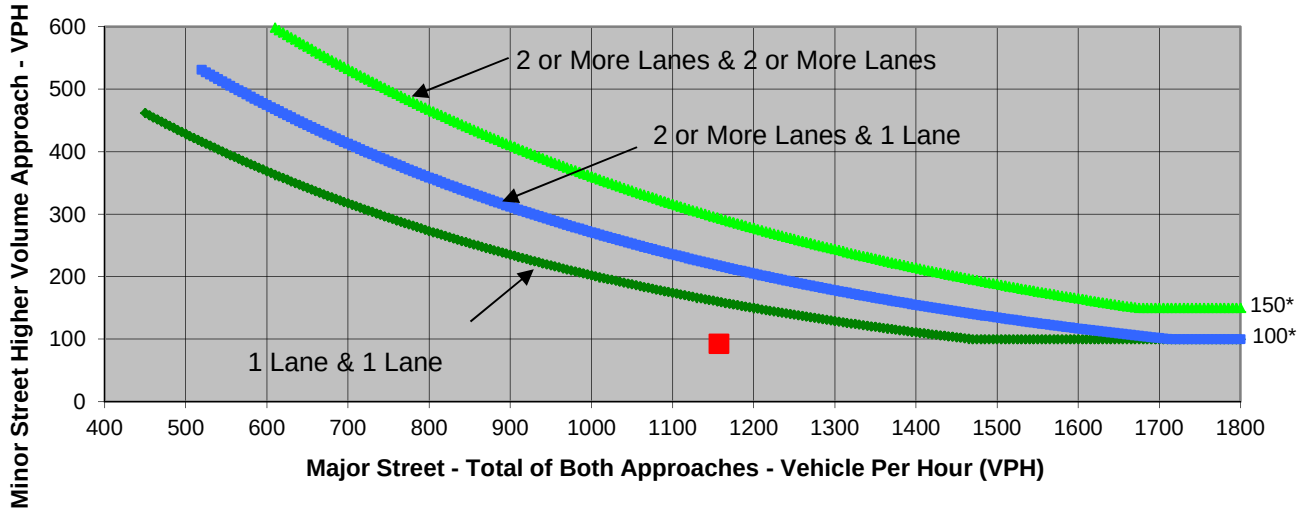
Major Street	McKinley Avenue	Project	Oakwood Landing
Minor Street	Denali Drive	Scenario	Cumulative Plus Project Conditions
		Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	12	0	49	0
Through	945	181	0	0
Right	0	19	44	0
Total	957	200	93	0

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	McKinley Avenue	Denali Drive	
Number of Approach Lanes	**2**	**1**	**NO**
Traffic Volume (VPH) *	**1,157**	**93**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

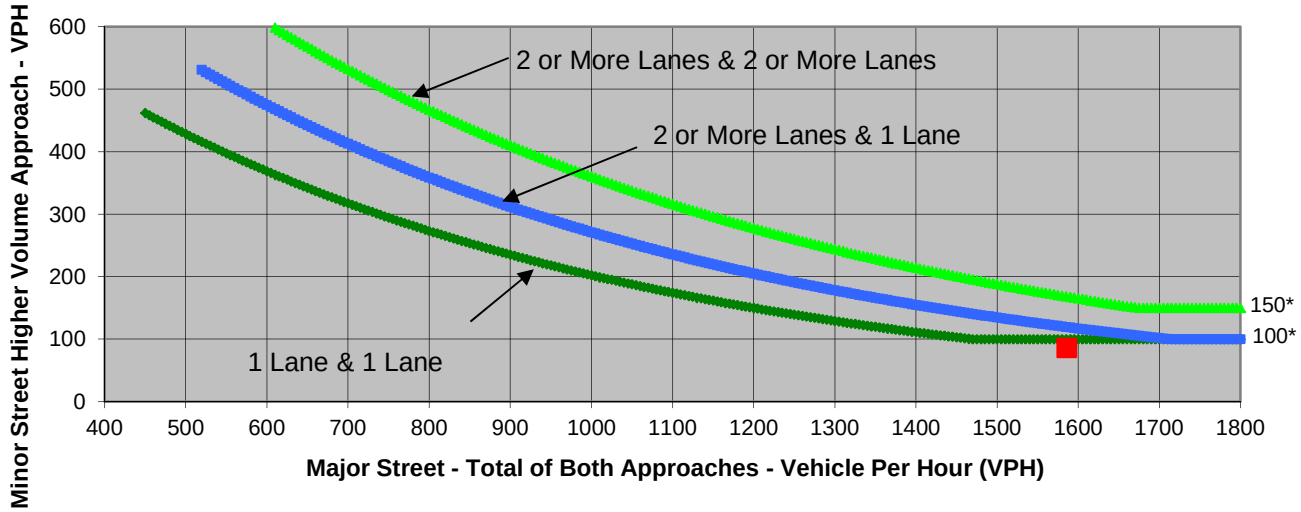
Major Street	McKinley Avenue	Project	Oakwood Landing
Minor Street	Denali Drive	Scenario	Cumulative Plus Project Conditions
		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left	19	0	52	0
Through	380	1,146	0	0
Right	0	41	34	0
Total	399	1,187	86	0

Major Street Direction

x	North/South
	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	McKinley Avenue	Denali Drive	
Number of Approach Lanes	**2**	**1**	**NO**
Traffic Volume (VPH) *	**1,586**	**86**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

Appendix F

Water Supply Assessment







Water Supply Assessment for Oakwood Landing

Prepared for

City of Manteca

January 2017

WEST YOST ASSOCIATES
Consulting Engineers

487-12-16-10

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WEST YOST ASSOCIATES
consulting engineers

WATER WASTEWATER STORMWATER

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Water Supply Assessment for Oakwood Landing

Prepared for

City of Manteca

January 2017

WEST YOST ASSOCIATES
Consulting Engineers

487-12-16-10



Project Manager
James P. Connell, PE

01/05/2017
Date

QA/QC Review
Elizabeth Drayer, PE

01/05/2017
Date

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Appendix A: Preliminary Water Calculations

EXECUTIVE SUMMARY

The proposed Oakwood Landing – Cerri & Denali Subdivisions Project (Proposed Project), if approved, would be constructed within the city limits of the City of Manteca (City). An Environmental Impact Report (EIR) is being prepared for the Project. The purpose of this Water Supply Assessment (WSA) is to support the EIR for the Proposed Project and to perform the evaluation required by Water Code sections 10910 through 10915 in connection with the Proposed Project. This WSA is not intended to reserve water, or to function as a "will serve" letter or any other form of commitment to supply water (see Water Code section 10914). The provision of water service will continue to be undertaken in a manner consistent with applicable City policies and procedures, consistent with existing law.

This WSA includes discussion of the projected water demands of the Proposed Project (Section 2), determinations required under applicable regulations (Section 3), the City's water service area (Section 4), the City's projected water demands through the year 2040 (Section 5), and the City's projected water supply sources and reliability through the year 2040 (Section 6). This WSA also documents the plan to ensure that sufficient water supplies will be available to serve the Proposed Project and the other planned development in the City's water service area through the planning period (Section 7). Finally, the water supply assessment approval process (Section 8) is discussed.

The projected potable water demand and supplies documented in this WSA are based on the City's 2015 Urban Water Management Plan (2015 UWMP) and additional documents provided by the City. Water Code section 10910(c)(4) states that:

> "*…the water supply assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.*"

Based on the technical analyses described in this WSA, the total projected water supplies documented to be available for the Proposed Project during Normal, Single Dry and Multiple Dry water years during a 20-year projection are sufficient to meet the projected water demands associated with the Proposed Project, in addition to existing and planned future uses. Documentation of the availability of this water to be allocated to the Proposed Project is provided in this WSA. This analysis has determined that the City's total projected water supplies will meet the above requirement from Water Code section 10910(c)(4), as documented in this WSA.

1.0 INTRODUCTION

The Proposed Project, if approved, would be constructed in the southwest portion of the Manteca city limits. The purpose of this Water Supply Assessment is to support the EIR for the Proposed Project. Key topics covered in this introduction include:

- Legal Requirements for the Water Supply Assessment
- Need for and Purpose of Water Supply Assessment
- Water Supply Assessment Preparation, Format and Organization

1.1 Legal Requirements for the Water Supply Assessment

California Senate Bill 610 (SB 610) and Senate Bill 221 (SB 221) amended state law, effective January 1, 2002, to improve the link between information on water supply availability and certain land use decisions made by cities and counties. SB 610 and SB 221 were companion measures that sought to promote more collaborative planning between local water suppliers and cities and counties. Both statutes require that detailed information regarding water availability be provided to the city and county decision-makers prior to approval of large development projects. The purpose of providing such information is to ensure that prudent water supply planning has been conducted, and that planned water supplies are adequate to meet existing demands, anticipated demands from approved projects, and the demands of proposed projects.

SB 610 amended California Water Code sections 10910 through 10915 to require agencies responsible for land use decisions:

1. To identify the public water purveyor(s) that may supply water for a proposed development project; and
2. To request a WSA from the identified water purveyor(s).

The City is the identified water purveyor for the Proposed Project. The purpose of the WSA is to demonstrate the sufficiency of the purveyor's water supplies to satisfy the water demands of the Proposed Project, while still meeting the water purveyor's obligations with regard to existing and planned future uses. Water Code sections 10910 through 10915 delineate the specific information that must be included in the WSA.

SB 221 amended State law (California Government Code section 66473.7) to require that approval by a city or county of certain residential subdivisions[1] requires an affirmative written verification of sufficient water supply. SB 221 was intended as a fail-safe mechanism to ensure that collaboration on finding the needed water supplies to serve a new large residential subdivision occurs before construction begins.

[1] Per Government Code Section 66473.7(a)(1) subdivision means a proposed residential development of more than 500 dwelling units.

1.2 Need for and Purpose of Water Supply Assessment

The purpose of this WSA is to perform the evaluation required by Water Code Sections 10910 through 10915 (SB 610) in connection with the Proposed Project. This WSA is not intended to reserve water, or to function as a "will serve" letter or any other form of commitment to supply water (see Water Code section 10914), nor is it intended to meet the requirements of SB 221. The provision of water service will continue to be undertaken in a manner consistent with applicable City policies and procedures, consistent with existing law.

1.3 Water Supply Assessment Preparation, Format and Organization

The format of this WSA is intended to clearly delineate compliance with the specific requirements for a WSA, per Water Code sections 10910 through 10915. This WSA includes the following sections:

- Section 1: Introduction
- Section 2: Description of Proposed Project
- Section 3: Required SB 610 Determinations
- Section 4: City of Manteca Water Service Area
- Section 5: City of Manteca Water Demands
- Section 6: City of Manteca Water Supplies
- Section 7: Determination of Water Supply Sufficiency Based on the Requirements of SB 610
- Section 8: Water Supply Assessment Approval Process
- Section 9: References

Relevant citations of Water Code sections 10910 through 10915 are included throughout this WSA to demonstrate compliance with the specific requirements of SB 610.

2.0 DESCRIPTION OF PROPOSED PROJECT

A general description of the Proposed Project location, proposed land uses, projected water demand, and proposed water supply is provided below.

2.1 Proposed Project Location

The Proposed Project is located in the southwest portion of the Manteca city limits and encompasses approximately 258.29 acres. The Project area is bounded on the north by an existing dirt roadway between Bronzan Road and Atherton Drive, on the east by South McKinley Avenue and an existing residential subdivision, and on the south and west by existing agricultural fields. The location of the Proposed Project in relation to the current City limits and Manteca General Plan Boundary is shown on Figure 2-1.

The Project site is relatively flat with natural gentle slope from north to south. The Project site topography ranges in elevation from approximately 20 to 30 feet above sea level. Currently, the majority of the Project is in active agricultural use. The Project site has some existing improvements including an existing barn area with associated equipment, dirt and paved roadways, and irrigation ditches.

The land uses immediately adjacent to the east, south, and west of the Project site include agricultural and residential uses, including ranchettes and large estate lots. Other existing uses east of the northerly portion of the Project site include a single family residential subdivision west of South Airport Way. Existing and future residential subdivisions also exist to the west of the Project site. Other nearby uses include rural residential uses north of the Project site and south of State Route 120.

2.2 Proposed Land Uses

The Proposed Project is primarily a residential development anticipated to include up to 1,265 units, with housing types classified as high density residential (HDR) and low density residential (LDR). Additionally, the Proposed Project includes 13.0 acres of general commercial uses anticipated to include up to approximately 237,838 square feet of commercial. The Proposed Project would include approximately 16.06 acres of parkland within the LDR land use classification and would maintain approximately 6.77 acres of non-irrigated open space.

The residential areas are anticipated to consist of two subdivision maps. One tentative subdivision map, the Denali Subdivision, would subdivide the northern 83.09 acres of the Project site to include 319 single family residential lots. The second tentative subdivision map, the Cerri Subdivision, would subdivide the southern 160.43 acres to include 656 single family residential lots. Additionally, 11.59 acres of the Project site would be developed into a maximum of 290 HDR units.

Land uses for the Proposed Project are summarized in Table 2-1, and the location of these land uses is shown on Figure 2-2.

Table 2-1. Proposed Land Uses for the Proposed Project[a]

Proposed Land Use	Approximate Area, acres	Average Dwelling Units per Acre	Number of Dwelling Units	Square Footage, sf
High Density Residential (HDR)	11.59	25.0	290	
Low Density Residential (LDR)	210.87	4.3	975	
General Commercial (GC)	13.00			237,838[b]
Parks (P)	16.06[c]			
Open Space (OS)	6.77			
Total	**258.29**	**--**	**1,265**	**237,838**

[a] Based on land use data reported in the Notice of Preparation (NOP) for Oakwood Landing – Cerri & Denali Subdivisions (August 2016).
[b] Based on a floor area ratio (FAR) of 0.42 as described in the NOP.
[c] In the Manteca 2023 General Plan, parks are included within LDR uses. To facilitate water demand projections, the park acreage has been separated from the total LDR acreage.

The Manteca General Plan 2023 designates the Project site as the Project site as Urban Reserve Business Industrial Park (UR-BIP, Floor Area Ratio [FAR] 1.0), Urban Reserve Very Low Density Residential (UR-VLDR, less than 2.0 dwelling units per acre [DU/ac]), Business Industrial Park (BIP, FAR 1.0), Commercial Mixed Use (CMU, 15.1 to 25 DU/ac), General Commercial (GC, FAR 0.6), and Open Space (OS).

The Proposed Project would require a General Plan Amendment to the Land Use Element to change land uses on the Project site. Changes to the Land Use Element would include changing approximately 121.67 acres of BIP to LDR uses, changing approximately 70.0 acres of UR-BIP to LDR uses, changing approximately 9.39 acres of UR-VLDR to LDR uses, changing approximately 23.41 acres of CMU to LDR uses, changing approximately 11.59 acres of BIP to HDR uses, maintaining approximately 13.0 acres as GC, and maintaining approximately 6.77 acres of OS. It is noted that parks would be permitted within the proposed LDR uses. The existing General Plan Land Use Designations for the Project site are shown in Table 2-2.

Table 2-2. City of Manteca Existing General Plan Land Uses for the Project Site[a]

Proposed Land Use	DU/ac	FAR	Approximate Area, acres
Urban Reserve Business Industrial Park (UR-BIP)	--	1.0	70
Urban Reserve Very Low Density Residential (UR-VLDR)	< 2.0	--	9.39
Business Industrial Park (BIP)	--	1.0	133.26
Commercial Mixed Use (CMU)	15.1 - 25	--	23.41
General Commercial (GC)	--	0.6	13
Open Space (OS)	--	--	6.77
Low Density Residential (LDR) / Parks (P)	--	--	2.46
		Total	**258.29**

[a] Based on land use data reported in the Notice of Preparation for Oakwood Landing – Cerri & Denali Subdivisions (August 2016).

2.3 Adjusted City Water Demand Factors

Unit water use factors for use in projecting water demand based on the proposed future land uses within the City's General Plan were developed as part of the City of Manteca 2005 Water Master Plan. These unit water use factors assume a per capita water use of approximately 225 gallons per capita per day (GPCD) and do not account for conservation goals, water recycling and other possible conservation derived sources. In the City's 2015 UWMP, water demand projections assume that the City is able to meet its SBX7-7 2020 per capita water use target of 179 GPCD. Therefore, to reflect the City's 2020 conservation goals, the water use factors for LDR and commercial mixed use (CMU) were reduced by 20 percent, corresponding to the overall reduction from 225 to 179 GPCD. It is anticipated that future State legislation may require further demand reduction, beyond 20 percent after 2020. The water use factors for Parks and Open Space were reduced by 10 percent to correspond with the climate data discussed in Section 4.

The unit water use factors for the land use designations applicable to the Proposed Project are summarized in Table 2-3.

Table 2-3. Water Use Factors by Land Use Type

Land Use Designation	Water Use Factor, gpd/acre	
	2005 Water Master Plan[a]	Adjusted for SBX7-7
High Density Residential (HDR)	6,500	5,200[b]
Low Density Residential (LDR)	2,800	2,240[b]
General Commercial (GC)	1,500	1,200[b]
Parks (P)	4,000	3,600[c]

[a] Based on unit water demand factors established in the City of Manteca 2005 Water Master Plan. These factors assume a per capita water use of approximately 225 GPCD and do not account for conservation measures.
[b] Based on a 20 percent reduction of factors shown in the City of Manteca 2005 Water Master Plan. These factors assume that the City is able to meet its per capita water use target of 179 GPCD.
[c] Based on a 10 percent reduction of factors shown in the City of Manteca 2005 Water Master Plan.

Potable water losses documented in the City's 2015 UWMP were calculated using a historical loss estimate of 12 percent of potable demands. It is anticipated that the implementation of advanced metering infrastructure (AMI) by 2018 will reduce losses to 8 percent by 2020, 7 percent by 2025, 6 percent by 2030, and 5 percent thereafter. Because the Proposed Project is anticipated to have AMI, this WSA assumes that unaccounted-for-water (UAFW) will be 6 percent of the Project's potable demands.

2.4 Projected Buildout Water Demand of Proposed Project

Based on the water use factors shown in Table 2-3 and a UAFW of 6 percent, the projected water demand at buildout of the Proposed Project is approximately 762 acre-feet per year (AFY), as shown in Table 2-4.

The Proposed Project does not intend to use recycled water at this time. The City currently uses undisinfected secondary effluent to irrigate fodder crops in the land adjacent to the City's wastewater

treatment plant. However, there is no infrastructure in place to deliver tertiary treated recycled water to retail customers. Although a Recycled Water Master Plan is being prepared with the intent that the City would use recycled water to offset potable water demands for outdoor uses in the future, recycled water infrastructure is not planned to be constructed in time to serve the buildout of the Proposed Project. Therefore, recycled water supplies are not included in this assessment.

However, if recycled water supplies become available to serve the Proposed Project, approximately 16 acres of parks within the Proposed Project site could be irrigated with recycled water. In this case, the recycled water demand would be approximately 69 AFY (65 AFY plus 6 percent UAFW) and the potable water demand could be reduced to approximately 693 AFY.

Table 2-4. Projected Water Demand for Buildout of the Proposed Project

Land Use Designation	Gross Area, acres	Dwelling Units, DU	Water Use Factor		Potable Water Demand, AFY
High Density Residential	11.59	290	208[a]	gpd/DU	68
Low Density Residential	210.87	975	521[b]	gpd/DU	569
General Commercial	13		1,200	gpd/acre	17
Parks	16.06		3,600	gpd/acre	65
Open Space	6.77		0[c]	gpd/acre	0
Subtotal	258.29	1,265			719
UAFW[d]					43
				Total Demand	**762**

[a] Based on a HDR water use factor of 5,200 gpd/acre and an average density of 25 du/acre.
[b] Based on a LDR water use factor of 2,240 gpd/acre and an average density of 4.3 du/acre.
[c] Because the open space will not be irrigated, a water use factor of 0 gpd/acre is assumed.
[d] Based on 6 percent of project water demands.

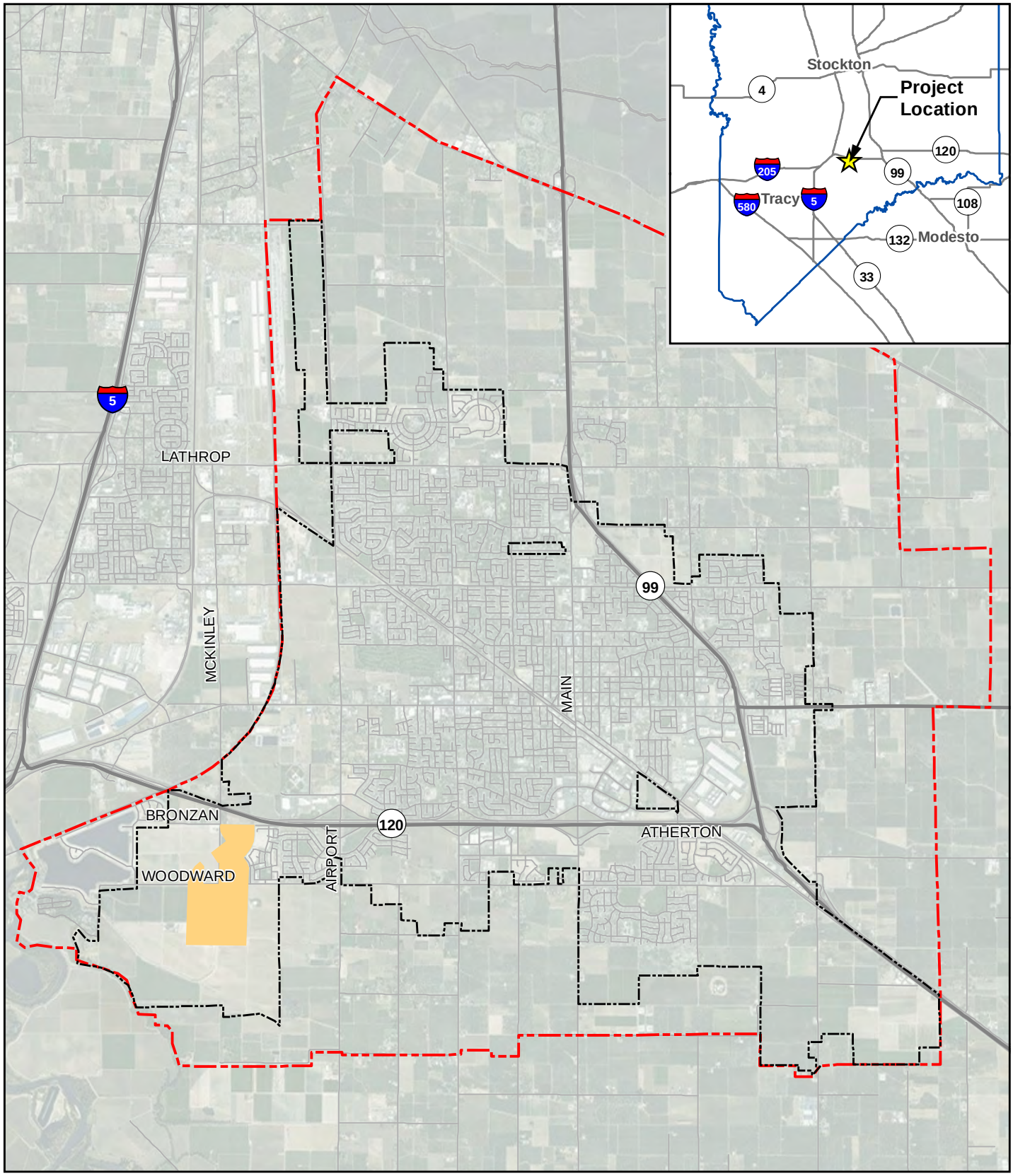
2.5 Projected Water Supply for Proposed Project

Water demands for the Proposed Project will be served using the City's existing and future portfolio of water supplies. The inclusion of existing and planned future supplies is specifically allowed by the Water Code:

> *Water Code section 10631(b): Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a).*

Proponents of the Proposed Project will provide their proportionate share of required funding to the City for the acquisition and delivery of treated potable water supplies to the Proposed Project area.

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Symbology

- Oakwood Landing Project
- Manteca City Limits
- Manteca General Plan Boundary
- San Joaquin County

N

0 3,000 6,000

Scale in Feet

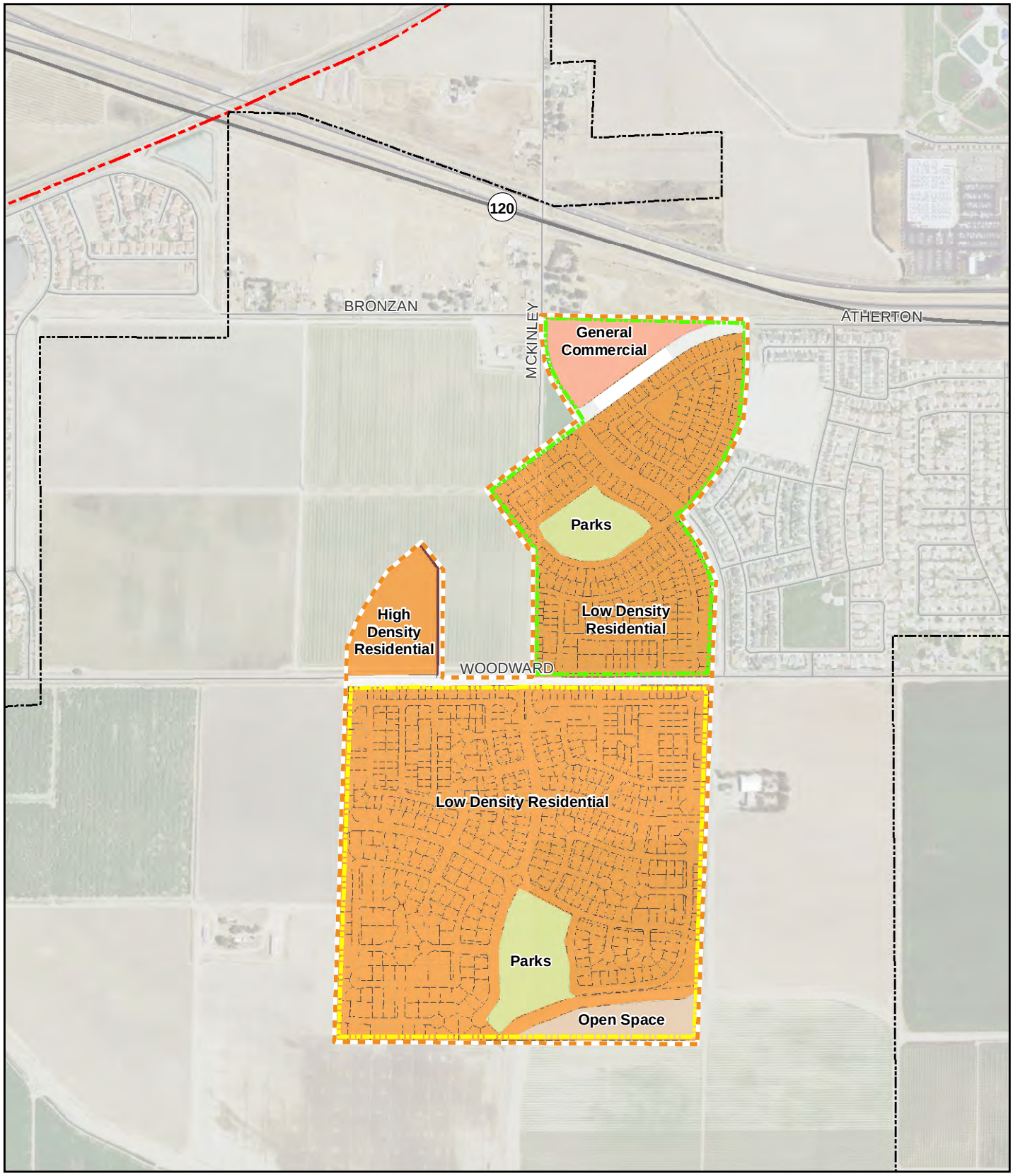
WEST YOST ASSOCIATES

Figure 2-1

Proposed Project Vicinity

City of Manteca
Water Supply Assessment
for Oakwood Landing

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Symbology

- Oakwood Landing Project
- Cerri Subdivision
- Denali Subdivision
- Manteca City Limits
- Manteca General Plan Boundary

N

0 500 1,000

Scale in Feet

WEST YOST ASSOCIATES

Figure 2-2

Conceptual Land Use Plan

City of Manteca
Water Supply Assessment
for Oakwood Landing

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3.0 REQUIRED SB 610 DETERMINATIONS

The following determinations must be made, pursuant to SB 610.

3.1 Does SB 610 apply to the Proposed Project?

Water Code sections 10910 and 10912 state:

> *10910 (a) Any city or county that determines that a project, as defined in Section 10912, is subject to the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) under Section 21080 of the Public Resources Code shall comply with this part.*
>
> *10912 (a) "Project" means any of the following:*
>
> *(1) A proposed residential development of more than 500 dwelling units.*
>
> *(2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.*
>
> *(3) A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.*
>
> *(4) A proposed hotel or motel, or both, having more than 500 rooms.*
>
> *(5) A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.*
>
> *(6) A mixed-use project that includes one or more of the projects specified in this subdivision.*
>
> *(7) A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500-dwelling unit project.*

Based on the following assumptions, SB 610 does apply to the Proposed Project.

1. The Proposed Project is subject to CEQA and that an EIR is required.
2. The Proposed Project, with its proposed 1,265 residential dwelling units, and other non-residential land uses, meets the definition of a "Project" as specified in Water Code section 10912(a) paragraph (1) as defined for residential development.

The Proposed Project has not been the subject of a previously adopted WSA and has not been included in an adopted WSA for a larger project. Therefore, according to Water Code section 10910(a), a WSA is required for the Proposed Project.

3.2 Does SB 221 apply to the Proposed Project?

In 2001, SB 221 amended State law to require that approval by a city or county of certain residential subdivisions requires an affirmative written verification of sufficient water supply. Per California Government Code section 66473.7(a)(1), a subdivision means a proposed residential development of more than 500 dwelling units. The Proposed Project, with its proposed 1,265 residential dwelling units, is therefore subject to the requirements of SB 221. A confirmation of water supply (SB 221) report will be required prior to final approvals.

3.3 Who is the identified public water system?

Water Code sections 10910 and 10912 state:

> *10910(b) The city or county, at the time that it determines whether an environmental impact report, a negative declaration, or a mitigated negative declaration is required for any project subject to the California Environmental Quality Act pursuant to Section 21080.1 of the Public Resources Code, shall identify any water system that is, or may become as a result of supplying water to the project identified pursuant to this subdivision, a public water system, as defined by Section 10912, that may supply water for the project.*
>
> *10912 (c) "Public water system" means a system for the provision of piped water to the public for human consumption that has 3,000 or more service connections…*

The Proposed Project area is within the City limits. Therefore, the City is the identified public water system for the Proposed Project.

3.4 Does the City have an adopted Urban Water Management Plan (UWMP) and does the UWMP include the projected water demand for the Proposed Project?

Water Code section 10910 states:

> *10910(c)(1) The city or county, at the time it makes the determination required under Section 21080.1 of the Public Resources Code, shall request each public water system identified pursuant to subdivision (b) to determine whether the projected water demand associated with a proposed project was included as part of the most recently adopted urban water management plan adopted pursuant to Part 2.6 (commencing with Section 10610).*

The City's 2015 UWMP is incorporated by reference into this WSA. The City's 2015 UWMP included existing and projected water demands for existing and projected future land uses to be developed within the City through the year 2040. The water demand projections in the City's 2015 UWMP included existing City water demands (as of 2015), plus projected water demands for future population growth.

In the City's 2015 UWMP, water demands through 2040 are projected based on a population growth rate of 2.3 percent per year and a 2020 per capita water use target of 179 GPCD. The population growth includes population acquired through City annexations of the surrounding area, as well as infill development. According to the City's 2015 UWMP, the Proposed Project is located within the City limits, and therefore is included in the demand projections.

The City's ability to meet the projected water demands for the Proposed Project, as defined in the City's 2015 UWMP, is described in Section 7.0 of this WSA.

4.0 CITY OF MANTECA WATER SERVICE AREA

This section presents the City's water service area including history and growth information for the City.

4.1 City of Manteca Water Service Area

The City is located in the flat plain at the northern end of California's San Joaquin Valley in south San Joaquin County. The City is located approximately 10 miles south of Stockton and 15 miles north of Modesto. Rich agricultural lands abut Manteca on the north, east, and south, while areas to the west are used primarily for industry. The Southern Pacific Railroad cuts the City diagonally from southeast to northwest. State Highway 120 crosses the southern portion of the City and provides a connection between Interstate 5, located about four miles to the west of the City, and Highway 99 along the eastern boundary of the City. This location creates a good setting for Bay Area commuter housing as well as new commercial and industrial locations.

The City's 2015 UWMP planning area corresponds with the City SOI established in the City's 2023 General Plan. The 2023 General Plan includes a designation of area planned to be developed by 2023. The City's current water distribution service area coincides with the City limits. It is assumed that water supply will be extended to areas within the planning area outside the existing City limits as those areas are approved for development and annexed into the City.

Presently, the City limits encompass an area of about 13,400 acres. The total existing developed land is made up of approximately 64 percent residential land uses, 18 percent commercial, industrial, and institutional land uses, and 18 percent agriculture, parks, landscape, and other land uses. Water demands not served by the City (e.g., agriculture, schools) rely on private groundwater wells and the South San Joaquin Irrigation District (SSJID) surface water for their supply.

4.2 Current and Projected Population

According to California Department of Finance data, between 1990 and 2015 the City experienced an average annual population growth rate of 2.3 percent. During this period, peak population growth occurred between 2000 and 2005 with an average growth rate of over 4 percent. Recent population growth since 2010 averages about 1.5 percent per year.

By comparison, the City's boundary area has grown from about 6,300 acres in 1990 to about 13,400 acres in 2015, an annual average area growth rate of about 3.1 percent. The greatest growth in area occurred between 1990 and 2000. Since 2000, the City's area has grown about 1.8 percent per year.

The City has elected to use the 1990-2015 average annual population growth rate of 2.3 percent to project the population of the water service area through 2040. It is assumed that this population growth includes population acquired through City annexations of the surrounding area, as well as City infill development. The current and projected water service area populations for the City are summarized in Table 4-1.

Table 4-1. Historical and Projected Population for City of Manteca Water Service Area	
Calendar Year	Estimated Population
2015	72,169
2020	80,900
2025	90,690
2030	101,660
2035	113,960
2040	127,740
Source: City of Manteca 2015 UWMP, Table 3-1 Population	

4.3 Climate

Climate and precipitation information are described in the City's 2015 UWMP. The City experiences hot summer temperatures with many days over 100°F during July and August. Nighttime temperatures during July and August drop into the fifties. The winter temperatures are much colder, with daytime highs in the forties and fifties. Winter lows are in the thirties and forties. Overnight freezes are infrequent. Spring and fall provide moderate temperature ranges. The mean annual precipitation is 14 inches.

Monthly climate data is provided in Table 4-2. The evapotranspiration (ETo) data in Table 4-2 was obtained from the California Irrigation Management Information Service (CIMIS) for Station 70-Manteca in the San Joaquin Region. Rainfall and temperature data was obtained by City staff from the National Oceanic and Atmospheric Administration (NOAA) website.

As indicated by the data in Table 4-2, a greater quantity of water is evaporated during May through August in correlation to high temperatures and low humidity, which results in high water demand for landscape irrigation.

Table 4-2. City of Manteca Average Monthly Climate Data[a]

Month	Average Evapotranspiration, inches	Rainfall, inches	Average Temperature, F°
January	0.90	2.85	45.5
February	1.73	2.27	50.5
March	3.38	2.06	54.3
April	5.04	1.12	59.5
May	6.45	0.41	66.3
June	7.54	0.08	72.7
July	8.02	0.03	77.3
August	7.11	0.04	76.2
September	5.19	0.27	72.7
October	3.33	0.73	64.3
November	1.60	1.81	53.2
December	0.86	2.33	45.6
Total/Average	**51.15**	**14.0**	**61.5**

[a] California Department of Water Resources, California Irrigation Management Information System, Station 70, November 1987 – present. Rainfall and temperature data were obtained by City staff from the NOAA website.

5.0 CITY OF MANTECA WATER DEMANDS

Water Code section 10910 states:

> *10910(c)(2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).*

The descriptions provided below for the City's water demands have been primarily taken from the City's 2015 UWMP.

The following topics are covered in this section:

- Existing and Projected Water Demand
- Dry Year Water Demand

5.1 Existing and Projected Water Demand

The City's 2015 UWMP describes the projected City water demand through 2040. The City's demand projections include water use reductions assuming the City is able to meet its 2020 per capita water use target. The water use projections developed in the City's 2015 UWMP were based on the following assumptions:

1. Historical residential water use makes up about 85 percent of total potable water demand; therefore, water demands are projected based on population growth rate of 2.3 percent per year and projected population. It is assumed that the growth includes areas annexed by the City, as well as City infill development.
2. The growth rate is applied to 2013 demand, as 2013 was the last year of normal water use before State water conservation regulations went into effect in 2014 and 2015.
3. Projected irrigation demand was reduced based on projected recycled water supply for landscape irrigation. Recycled water would replace potable and raw water.
4. Potable water losses were calculated using a historical loss estimate of 12 percent of potable demands, and anticipating that the implementation of AMI by 2018 will reduce losses to 8 percent by 2020, 7 percent by 2025, 6 percent by 2030, and 5 percent thereafter.
5. To meet the SBX7-7 Target Water Use of 179 GPCD for the projected population, the projected total potable water use (including landscape irrigation and unaccounted for water losses) was further reduced by approximately 1 percent for the years 2020 through 2040.

The City's existing and projected potable and raw water demand, as documented in the City's 2015 UWMP, is shown in Table 5-1. The projected water demands shown in Table 5-1 will be used throughout this WSA.

Table 5-1. City of Manteca Existing and Projected Total Water Demand in Normal Years, AFY

	2015	2020	2025	2030	2035	2040
Potable and Raw Water Demand	12,844	19,350	21,480	23,880	25,960	27,530
Recycled Water Demand[(a)]	1,463	900	480	290	740	2,240
Total Water Demand	14,307	20,250	21,960	24,170	26,700	29,770

Source: City of Manteca 2015 UWMP, Table 4-3 Total Water Demands

(a) Current recycled water use is limited to undisinfected secondary effluent used to irrigate fodder crops on lands adjacent to the City's wastewater treatment plant.

The City's projected water demand at buildout (based on existing water demand, on-going development projects with approved water supply, the projected water demand of the Project, and undefined future developments) is summarized in Table 5-2. The City's preliminary water demand projections for future developments with approved water supply, as of September 2016, have been updated by West Yost to be based on the HDR and LDR water use factors that were adjusted for SBX7-7 (see Table 2-3). These revised demand projections for future developments within the City are included in Appendix A of this WSA.

Table 5-2. City of Manteca Projected Future Water Demand at 2040, AFY

	Potable and Raw Water	Recycled Water	Total
Current (2015) Water Demand[a]	16,249	1,463	17,712
Future Developments with Approved Water Supply[b]	6,543	—	6,543
Current Applications within Planning Area[c]	2,964	—	2,964
Subtotal (without Project)	**25,756**	**1,463**	**27,219**
Project (Oakwood Landing)[d]	762	—	762
Subtotal (with Project)	**26,518**	**1,463**	**27,981**
Undefined Future Developments[e]	1,012	777	1,789
Total Water Demand	**27,530[f]**	**2,240[g]**	**29,770**

[a] The current potable and raw water demand is based on the City's 2015 service area population (72,169 people) and the City's 2015 per capita water use target (201 GPCD). Recycled water demand is from the City's 2015 UWMP, Table 4-3.

[b] Includes projects with existing entitlements and projects with adopted WSA, as of September 2016 (see Appendix A). Equals the "Finished Lots" total (437 AFY), "Entitled Lots" total (4,973 AFY), "Finished Apt Units" total (1,133 AFY) shown in Appendix A.

[c] Includes current applications within the City's planning area (no adopted WSA or entitlement), as of September 2016 (see Appendix A). Equals Dolcinea (24 AFY), Hat Ranch (477 AFY), Oakwood Trails (403 AFY), Marini Complex (4 AFY), Copper Cove/Yosemite (888 AFY), Northwest Airport Way (281 AFY), and Griffin Park (887 AFY). An estimated water demand of 887 AFY, instead of 949 AFY, was used for Griffin Park to reflect the demand reported in the Griffin Park draft WSA, dated October 2016.

[d] Based on Proposed Project's net total demand from Table 2-4. The projected water demand for the Proposed Project only includes potable water use.

[e] Balance between Subtotal (with Project) and Total Water Demand.

[f] Based on the City's 2040 total potable and raw water demand (From Table 4-3 in the City's 2015 UWMP).

[g] Based on the City's 2040 total recycled water demand (From Table 4-3 in the City's 2015 UWMP).

5.2 Dry Year Water Demand

The City currently has a water conservation program in place, as described in Chapter 8 of the City's 2015 UWMP. The City's Water Shortage Contingency Plan includes a five-stage plan describing water conservation measures to reduce water demand by up to 50 percent in the event of a water supply shortage or emergency. The water shortage stages, and their respective anticipated reduction in potable water demand, are shown in Table 5-3.

Table 5-3. Water Shortage Contingency Plan Projected Demand Reduction

Stage	Percent Supply Reduction
I	Up to 10 percent
II	11 – 20 percent
III	21 – 30 percent
IV	31 – 40 percent
V	41 – 50 percent

Source: City of Manteca 2015 UWMP, Table 8-1 Stages of WSCP

When comparing potable water supply to demand in the City's 2015 UWMP and in this WSA, the dry year water demands are assumed to not include implementation of the City's Water Shortage Contingency Plan. This is a conservative assumption as additional water conservation will likely occur as a result of the City's implementation of its Water Shortage Contingency Plan in response to dry years or other water supply shortages. Table 5-4 presents the projected future dry year potable water demand.

Table 5-4. Projected Future Dry Year Potable and Raw Water Demand

Hydrologic Condition	Demand Reduction[(a)]	2020	2025	2030	2035	2040
Single Dry Year, AFY	0%	19,350	21,480	23,880	25,960	27,530
Multiple Dry Years, AFY[(b)]	0%	19,350	21,480	23,880	25,960	27,530

(a) Conservatively assumes no demand reduction in dry years.
(b) Represents demands for each year of the 3-year multiple dry year period.

6.0 CITY OF MANTECA WATER SUPPLIES

Key topics addressed in this section include:

- Regulatory Background
- City's Surface Water Supply
- City's Groundwater Supply
- City's Potable Water Supply Availability and Reliability

6.1 Regulatory Background

Water Code section 10910 states:

> *10910(c)(2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f) and (g).*
>
> *10910(d)(1) The assessment required by this section shall include an identification of any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and a description of the quantities of water received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts.*
>
> *10910(d)(2) An identification of existing water supply entitlements, water rights, or water service contracts held by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall be demonstrated by providing information related to all of the following:*
>
> *(A) Written contracts or other proof of entitlement to an identified water supply.*
>
> *(B) Copies of a capital outlay program for financing the delivery of a water supply that has been adopted by the public water system.*
>
> *(C) Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply.*
>
> *(D) Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.*
>
> *10910(e) If no water has been received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts, the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall also include in its water supply assessment pursuant to subdivision (c), an identification of the other public water systems or water service contract-holders that receive a water supply or have existing water supply entitlements, water rights, or water service contracts, to the same source of water as the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has identified as a source of water supply within its water supply assessments.*

It is anticipated that water supply for the Proposed Project would be local groundwater and treated surface water from SSJID's South County Water Supply Program (SCWSP).

Proponents of the Proposed Project will provide their proportionate share of required funding to the City for the acquisition and delivery of treated potable water supplies to the Proposed Project area through connection fees and other means. This arrangement will be outlined within the Development Agreement between the project applicant and the City. The Development Agreement will be completed and approved as part of the City's formal land use actions.

The summaries of the City's water supplies provided below have been taken, for the most part, from the City's 2015 UWMP.

6.2 Surface Water Supply

The principal component of future water supply for the City is deliveries from the SCWSP. The City, along with four other cities/retail water suppliers (Escalon, Lathrop, Tracy, and Ripon), signed water supply agreements with SSJID to supply treated potable water to the participating cities.

The Nick C. DeGroot WTP is commissioned for the SCWSP and is currently operated by SSJID. The WTP has a total Phase 1 capacity of 40,350 AFY and the Phase 2 capacity is anticipated to be 63,600 AFY. However, Phase 2 has not yet been implemented and there are no immediate plans to bring Phase 2 online. Currently, the City is allotted 11,500 AFY under Phase 1 and a total of 18,500 AFY under Phase 2. The term of the City's water supply agreement with SSJID is through December 2029. After this time, ownership of the WTP reverts to the cities unless the agreement is renewed. Historically, the City has not utilized its full allocation of surface water due to system constraints and, more recently, State and SSJID supply limits in response to the drought. It is anticipated that the City will utilize the full amount of the SCWSP by 2025.

6.3 Groundwater Supply

Water Code section 10910 states:

> *10910(f) If a water supply for a proposed project includes groundwater, the following additional information shall be included in the water supply assessment.*
>
> *10910(f)(1) A review of any information contained in the urban water management plan relevant to the identified water supply for the proposed project.*
>
> *10910(f)(2) A description of any groundwater basin or basins from which the proposed project will be supplied. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current bulletin of the department that characterizes the condition of the groundwater basin, and a detailed description by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), of the efforts being undertaken in the basin or basins to eliminate the long term overdraft condition.*

10910(f)(3) A detailed description and analysis of the amount and location of groundwater pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), for the past five years from any groundwater basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historical use records.

A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), from any basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historical use records.

10910(f)(4) An analysis of the sufficiency of the groundwater from the basin or basins from which the proposed project will be supplied to meet the projected water demand associated with the proposed project.

A water assessment shall not be required to include the information required by this paragraph if the public water system determines, as part of the review required by paragraph (1), that the sufficiency of groundwater necessary to meet the initial and projected water demand associated with the project was addressed in the description and analysis required by paragraph (4) of subdivision (b) of Section 10631.

The local groundwater basin and City groundwater use are described in the City's 2015 UWMP. A summary of the groundwater basin and historical and projected groundwater pumping are provided below.

6.3.1.1 Basin Description

The City's wells are located in the Eastern San Joaquin County Groundwater Basin (ESJCGB), which is a subbasin of the San Joaquin Valley Groundwater Basin. The groundwater aquifers underlying the City have been identified to include four geologic formations. In increasing depth from the surface, the identified aquifers are Victor Formation, Laguna Formation, Mehrten Formation, and Valley Springs Formation. Due to the alluvial generation of these aquifers, there is significant variation in grain size, with lenses and strata of high yield gravel, permeable sandy material and lower permeability clays. In general, the strata slope from the hills east of the City downward to the west, providing good recharge from hill runoff as well as from the Stanislaus River. The City's wells primarily withdraw water from the Laguna and Victor Formations.

The basin is not adjudicated; however, a basin management plan has been created. The Eastern San Joaquin Groundwater Basin Groundwater Management Plan (ESJGB-GMP) (NSJCGB, 2004) was prepared in September 2004. According to Department of Water Resources (DWR) Bulletin 118 (DWR, 2006), the ESJCGB is in a critical condition of overdraft. Groundwater levels have been historically declining at an average rate of 1.7 feet per year. Groundwater overdraft in the overall basin and the City's groundwater withdrawal rate is of vital concern to the City as this poses a long-term risk to the reliability of the groundwater supply.

6.3.1.2 Groundwater Production

According to the City's 2015 UWMP, the sustainable yield of the groundwater basin was estimated in a 1985 study[2] to be approximately 1 acre-foot per acre per year. Although groundwater pumping in some years has exceeded that rate, as part of the SCWSP, the City intends to limit groundwater pumping to that rate or less. Projected groundwater availability is therefore based on an assumption that 1 AFY of groundwater is available per acre of City service area.

The total groundwater pumping that occurs within the City boundaries include City-owned municipal wells and City-owned park irrigation wells, in addition to irrigation and domestic wells owned and operated by others. This section provides a summary of the estimated groundwater pumping that occurs within the current City limits and planning area. According to the City's 2015 UWMP, groundwater pumping data collection is on-going and there are potentially many groundwater pumping wells that are unmetered and unidentified.

6.3.1.2.1 City-Produced Groundwater

The City owns and operates 15 potable water wells and 31 irrigation wells. The City's annual potable groundwater production has steadily increased historically, reaching a peak of 14,900 acre-feet (AF) in 2004. Commissioning of the surface water treatment plant in 2005 decreased groundwater use considerably and currently supplies an average of 52 percent of the City's annual potable water supply. Since 2005, the City has constructed dedicated irrigation wells at many parks in an effort to reduce potable demand, which requires wellhead treatment at many wells for arsenic and other constituents to meet drinking water standards. In 2000, the City pumped about 1.2 AFY/acre, but this has since decreased to about 0.7 AFY/acre in 2010 and to about 0.5 AFY/acre in 2015.

When the City annexes new areas, there is a corresponding increase in total groundwater safe yield. However, the 1 AFY/acre does not provide sufficient water supply for most projects.

6.3.1.2.2 Pumping by Others

Because there are numerous wells not owned by the City that are drawing from the Basin, this could affect the amount of groundwater available to the City within the groundwater basin safe yield. Wells currently in operation not owned by the City include private domestic wells, agricultural wells, wells for school irrigation owned by the Manteca Unified School District (MUSD), and irrigation wells owned by SSJID, among others. Well completion reports obtained from DWR suggest that approximately 1,000 water wells have been constructed within the General Plan area since record keeping began in the 1960s; however, many may not have been registered as abandoned. It is anticipated that most domestic wells are no longer in use, though further investigation would be needed to verify this assumption.

[2] "Eastern San Joaquin County Groundwater Study. Final Report." San Joaquin County Flood Control and Water Conservation District, prepared by Brown & Caldwell Consulting Engineers, 1985.

It is known that MUSD and others own and operate wells within the City and its planning area. It is also assumed that pumping by MUSD and other known pumpers within the City and its planning area should be included in the groundwater safe yield accounting for purposes of this evaluation. Groundwater pumping by others may also be included in future updates of this initial estimate.

Metered pumping records for MUSD have not yet been provided. According to the City's 2015 UWMP, the groundwater pumping from other ESJCGB entities were estimated as follows:

- The Manteca Unified School District is assumed to irrigate 25 percent of its parcels, at 4 AFY/acre. Given that the MUSD has approximately 500 total acres, the total annual water use should be limited to approximately 500 AFY.
- According to SSJID pumping records, for 2010 through 2015, an average of 4,860 AFY groundwater was pumped from SSJID-leased wells. Of this, an average of 2,860 AFY was pumped within the City of Manteca and the City's Planning Area. Therefore, groundwater pumping from SSJID-leased wells is projected to be 2,860 AFY.
- Other known industrial groundwater pumpers include Eckerts Cold Storage. The City treats over 130 AF of wastewater produced by Eckerts each year. Based upon this average, groundwater pumping is estimated at over 150 AFY. Other industrial and commercial users likely exist.

6.3.1.3 Historical Groundwater Pumping

Historically, the City extracted groundwater at a rate as high as 1.6 AFY/acre, based on the developed City area. As discussed previously, the SCWSP allowed the City to reduce local groundwater extraction to less than the estimated basin safe yield of 1.0 AFY/acre.

Since 2006, after the commissioning of the SCWSP, the total groundwater pumping for the City of Manteca has ranged from 8,062 AFY to 10,374 AFY averaging about 8,700 AFY. Pumping amounts have generally been consistent over the last 5 years, with a decrease in 2014 and 2015, likely attributable to statewide mandatory demand reduction regulations. With this exception, there were no limitations or challenges for obtaining groundwater during the last 5 years, and the available groundwater quantity was sufficient. Groundwater pumping by City wells from 2011 to 2015 is summarized in Table 6-1.

Table 6-1. Historical Groundwater Production, AFY

	2011	2012	2013	2014	2015
Groundwater Supply	9,156	10,374	9,922	6,546	7,249

Source: City of Manteca 2015 UWMP, Table 6-2 Groundwater Volume Pumped

6.4 Potable Water Supply Availability and Reliability

The City's surface water and groundwater supply reliability as described in the City's 2015 UWMP is summarized below.

6.4.1 Surface Water Reliability

SSJID has existing agreements to provide surface water to agricultural interests, federal and state agencies, and cities in the south San Joaquin area. Some of these agreements are long-term, while others are as short as one week for agricultural deliveries.

Surface water reliability is in part reliant on storage and releases from upstream dams along the Stanislaus River with respect to the Nick C. DeGroot WTP intake location. While SSJID has surface water rights to approximately 600,000 AFY jointly held with the Oakdale Irrigation District (OID), the full allocation to SSJID and OID are subject to runoff from the Stanislaus River and other constraints per the 1988 Stipulation and Agreement with the U.S. Bureau of Reclamation that constructed and operates New Melones Reservoir on the Stanislaus River.

According to the 1988 Agreement, SSJID is entitled to 300,000 AFY during normal water years, however drought conditions and seasonal variations have the potential to reduce the allocation to SSJID and the contracted cities it delivers water to, including the City of Manteca. The New Melones Reservoir inflow has a direct effect on surface water availability to SSJID. The following equation governs water supply availability to SSJID when inflows are less than 600,000 AF:

New Melones Inflow + [(600,000 - New Melones Inflow) / 3]

Currently, SSJID is expected to provide total supplies (including irrigation and potable) ranging from 225,000 AFY to 300,000 AFY, though the lowest supply on record was 225,000 AF in both 2014 and 2015 (SSJID 2016). In the event that shortages do occur, SSJID and OID share the deficiencies.

As mentioned in *Section 6.2*, the City is allotted 11,500 AFY from SSJID under Phase 1 and a total of 18,500 AFY under Phase 2. It is anticipated that the City will implement Phase 2 of the SCWSP by 2025, providing an additional 7,000 AFY in surface water supply to the City.

6.4.1.1 Reliability of SCWSP Deliveries

Under single-year and multiple-year dry period scenarios, deliveries to the City by SSJID could be reduced. The availability and reliability of the City's SCWSP surface water deliveries during dry years according to the City's 2015 UWMP and SSJID's 2015 UWMP are described below:

- For Single Dry Year reliability, the City has based its projected SSJID allocations on the single driest hydrologic year (Year 1977). With this assumption, it is anticipated that the City will receive 75 percent of its normal year water supply during a single dry year.

- For Multiple Dry Year 1 reliability, the City has based its projected SSJID allocations on the first year of a multiple dry hydrologic year (Year 1990). With this assumption, it is anticipated that the City will receive 87 percent of its normal year water supply during the first year of a multiple dry year.
- For Multiple Dry Year 2 reliability, the City has based its projected SSJID allocations on the second year of a multiple dry hydrologic year (Year 1991). With this assumption, it is anticipated that the City will receive 89 percent of its normal year water supply during the second year of a multiple dry year.
- For Multiple Dry Year 3 reliability, the City has based its projected SSJID allocations on the third year of a multiple dry hydrologic year (Year 1992). With this assumption, it is anticipated that the City will receive 84 percent of its normal year water supply during the third year of a multiple dry year.

The projected surface water deliveries available to the City are presented in Table 6-2.

Table 6-2. SCWSP Surface Water Deliveries to the City of Manteca during Hydrologic Normal, Single-Dry, and Multiple-Dry Years, AFY

	Percent of Normal Supply	2020	2025	2030	2035	2040
Normal Year[(a)]	0%	11,500	18,500	18,500	18,500	18,500
Single Dry Year	75%	8,625	13,875	13,875	13,875	13,875
Multiple Dry Year 1	87%	10,005	16,095	16,095	16,095	16,095
Multiple Dry Year 2	89%	10,235	16,465	16,465	16,465	16,465
Multiple Dry Year 3	84%	9,660	15,540	15,540	15,540	15,540

[(a)] Source: City of Manteca 2015 UWMP, Table 6-11 Projected Water Supplies.

6.4.2 Groundwater Reliability

There are many factors that can affect groundwater supply reliability, including current storage conditions, water quality, seasonal groundwater level variations and climate change. Reduced use by the City, combined with seasonal variations such as intense wet seasons, can result in increased groundwater table elevation. Additionally, all wells are located in the western portion of the SSJID service area and draw from the Eastern San Joaquin Subbasin, the same basin that the City of Manteca, the City of Lathrop, the City of Stockton and other groundwater users draw from. For the purposes of this evaluation, only groundwater pumping estimated to be occurring within the City General Planning area is included.

While seasonal fluctuations do have a noticeable effect on groundwater elevation, the overall trend showed a decline over time until the City began to use imported surface water in 2005. Historical trends from California Statewide Groundwater Elevation Monitoring (CASGEM) indicate that the basin has experienced groundwater overdraft conditions. The introduction of surface water supply has helped groundwater elevation trends recover within the City by reducing pumping in the area.

Groundwater supply projections include approved proposed and entitled developments outside of the City boundaries, but within the planning area, and estimated groundwater pumping by others within the planning area. The projected groundwater supply reliability does not account for groundwater pumping outside the City planning area, nor undocumented privately owned domestic or irrigation wells. Groundwater use may increase as population increases, and groundwater use by others (including MUSD and agricultural users) may also increase in single-dry years and multiple-dry years (when surface water cutbacks occur). Constant groundwater demands from the MUSD and agricultural users have been assumed for all hydrologic scenarios.

The projected groundwater supplies available to the City and the Proposed Project are summarized in Table 6-3. The total groundwater supplies are considered 100 percent reliable during hydrologic normal years, single dry years, and multiple dry years.

Table 6-3. Projected Groundwater Production during Hydrologic Normal, Single-Dry, and Multiple-Dry Years, AFY[(a)]

	2020	2025	2030	2035	2040
City Safe Yield	13,570	13,570	13,570	13,570	13,570
MUSD Estimated Pumping	- 500	- 500	- 500	- 500	- 500
Estimated Agricultural Irrigation	- 2,860	- 2,860	- 2,860	- 2,860	- 2,860
Eckerts Cold Storage Pumping	- 150	- 150	- 150	- 150	- 150
Total Supply	**10,060**	**10,060**	**10,060**	**10,060**	**10,060**

[(a)] Source: City of Manteca 2015 UWMP, Table 6-10 Projected Groundwater Supplies

7.0 DETERMINATION OF WATER SUPPLY SUFFICIENCY BASED ON THE REQUIREMENTS OF SB 610

Water Code section 10910 states:

> *10910(c)(4) If the city or county is required to comply with this part pursuant to subdivision (b), the water supply assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.*

Pursuant to Water Code section 10910(c)(4), and based on the technical analyses described in this WSA, the total projected water supplies determined to be available for the Proposed Project during Normal, Single Dry, and Multiple Dry water years during a 20-year projection will meet the projected water demand associated with the Proposed Project, in addition to existing and planned future uses.

A comparison of the City's projected potable and raw water supplies and demands is shown in Table 7-1 for Normal, Single Dry, and Multiple Dry Years. This comparison can also be seen on Figures 7-1 through 7-5.

As shown in Table 7-1, demand within the City's service area is not expected to exceed the City's supplies in any normal year between 2020 and 2040.

For purposes of this WSA, no demand reductions are assumed during dry years. With this assumption, potential deficits in water supply occur after 2035 during Single Dry Years and occur in 2040 during Multiple Dry Years. During Single Dry Years, the City's total annual water demand is estimated to exceed total annual supply by 2,025 AF and 3,595 AF in 2035 and 2040, respectively. This results in a total water supply shortfall of 8 percent in 2035 and 13 percent in 2040. During all three Multiple Dry Years, the City can anticipate water supply shortages by 2040. The greatest water supply shortfall is 7 percent (1,930 AF), which occurs during a Multiple Dry Year 3. To mitigate these potential deficits, the City may need to implement minimal short-term demand reductions (water conservation) and/or employ additional water supply options.

The scale of shortages anticipated by 2035 in Single Dry Years and 2040 in Multiple Dry Years can be mitigated through the implementation of the Water Shortage Contingency Plan described in Chapter 8 of the City's 2015 UWMP and additional conservation measures discussed in Chapter 9 of the City's 2015 UWMP. To prevent water supply deficits during Single Dry Years, the City may need to reduce demands by 13 percent, which is well within the 20 percent demand reduction defined in Stage II of the City's Water Shortage Contingency Plan. During Multiple Dry Years, the City may need to reduce demands by as much as 7 percent, which is within the 10 percent demand reduction defined in Stage I of the City's Water Shortage Contingency Plan.

To ensure adequate supply to accommodate the City's projected growth and demand, additional long-term water supply sources for the City have also been identified. As described in Chapter 6 of the City's 2015 UWMP, three water supply options were identified to mitigate future water supply shortfalls:

1. Recycled water: The City is currently in the process of developing a reclaimed water master plan. Upon adoption, this plan will describe a framework and funding plan to provide reclaimed water throughout the City to offset current park irrigation uses. The equivalent quantity of groundwater could be treated for potable municipal uses, while staying within the sustainable yield constraints of 1 AFY/acre.
2. Additional untreated surface water: Most of the lands that will be developed and annexed by the City currently rely on groundwater or raw water through SSJID. If the City were able to access the same water available to those lands after annexation, the City could either use this water to treat for potable municipal uses or to offset the potable water used for irrigation.
3. Additional treated surface water: Prior to the contract renewal due in 2029, the City could negotiate and obtain additional potable water supply from the SCWSP.

Table 7-1. Summary of Potable and Raw Water Demand Versus Supply During Hydrologic Normal, Single Dry, and Multiple Dry Years

Hydrologic Condition		Supply and Demand Comparison, AFY				
		2020	2025	2030	2035	2040
Normal Year						
Available Potable and Raw Water Supply[a]		21,560	28,560	28,560	28,560	28,560
Total Water Demand[b]		19,350	21,480	23,880	25,960	27,530
	Potential Surplus (Deficit)	**2,210**	**7,080**	**4,680**	**2,600**	**1,030**
	Supply Shortfall, Percent of Demand	-	-	-	-	-
Single Dry Year						
Available Potable and Raw Water Supply[a]		18,685	23,935	23,935	23,935	23,935
Total Water Demand[b]		19,350	21,480	23,880	25,960	27,530
	Potential Surplus (Deficit)	**(665)**	**2,455**	**55**	**(2,025)**	**(3,595)**
	Supply Shortfall, Percent of Demand	3%	-	-	8%	13%
Multiple Dry Year						
Multiple Dry Year 1	Available Potable and Raw Water Supply[a]	20,065	26,155	26,155	26,155	26,155
	Total Water Demand[b]	19,350	21,480	23,880	25,960	27,530
	Potential Surplus (Deficit)	**715**	**4,675**	**2,275**	**195**	**(1,375)**
	Supply Shortfall, Percent of Demand	-	-	-	-	5%
Multiple Dry Year 2	Available Potable and Raw Water Supply[a]	20,295	26,525	26,525	26,525	26,525
	Total Water Demand[b]	19,350	21,480	23,880	25,960	27,530
	Potential Surplus (Deficit)	**945**	**5,045**	**2,645**	**565**	**(1,005)**
	Supply Shortfall, Percent of Demand	-	-	-	-	4%
Multiple Dry Year 3	Available Potable and Raw Water Supply[a]	19,720	25,600	25,600	25,600	25,600
	Total Water Demand[b]	19,350	21,480	23,880	25,960	27,530
	Potential Surplus (Deficit)	**370**	**4,120**	**1,720**	**(360)**	**(1,930)**
	Supply Shortfall, Percent of Demand	-	-	-	1%	7%

[a] Equals the sum of the City's projected surface water supplies (see Table 6-2 of this WSA) and the City's projected groundwater supplies (see Table 6-3 of this WSA).

[b] Equals the City's total projected potable and raw water demand (From Table 4-3 in the City's 2015 UWMP).

Figure 7-1. City of Manteca Future Potable Water Supply vs. Demand in Normal Years

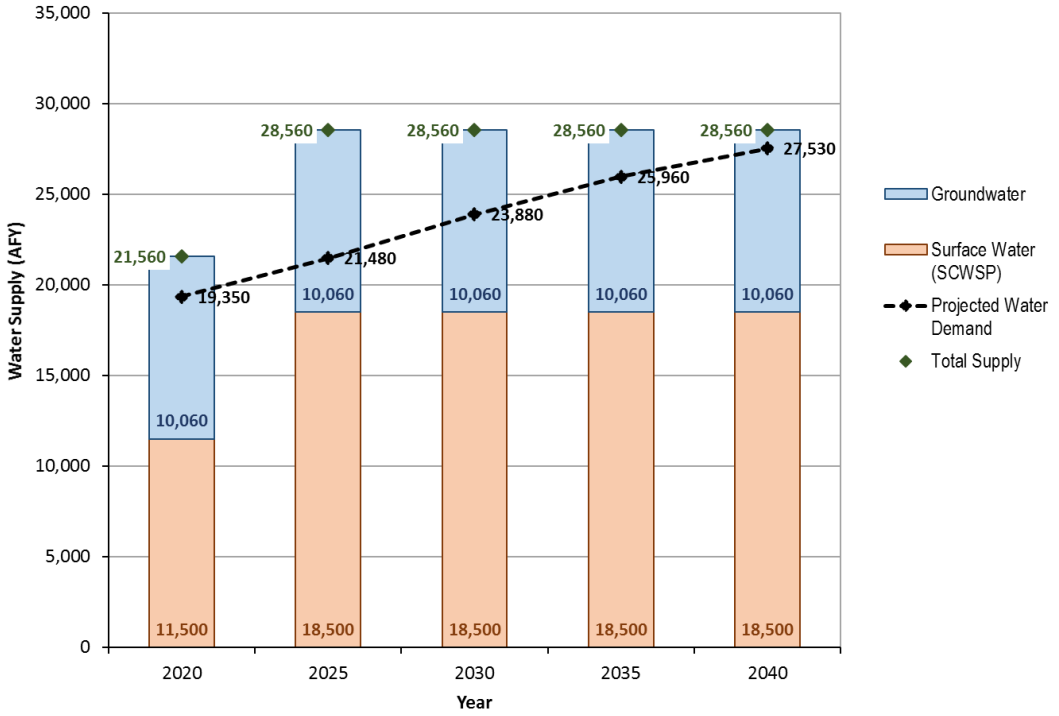


Figure 7-2. City of Manteca Future Potable Water Supply vs. Demand in Single Dry Years

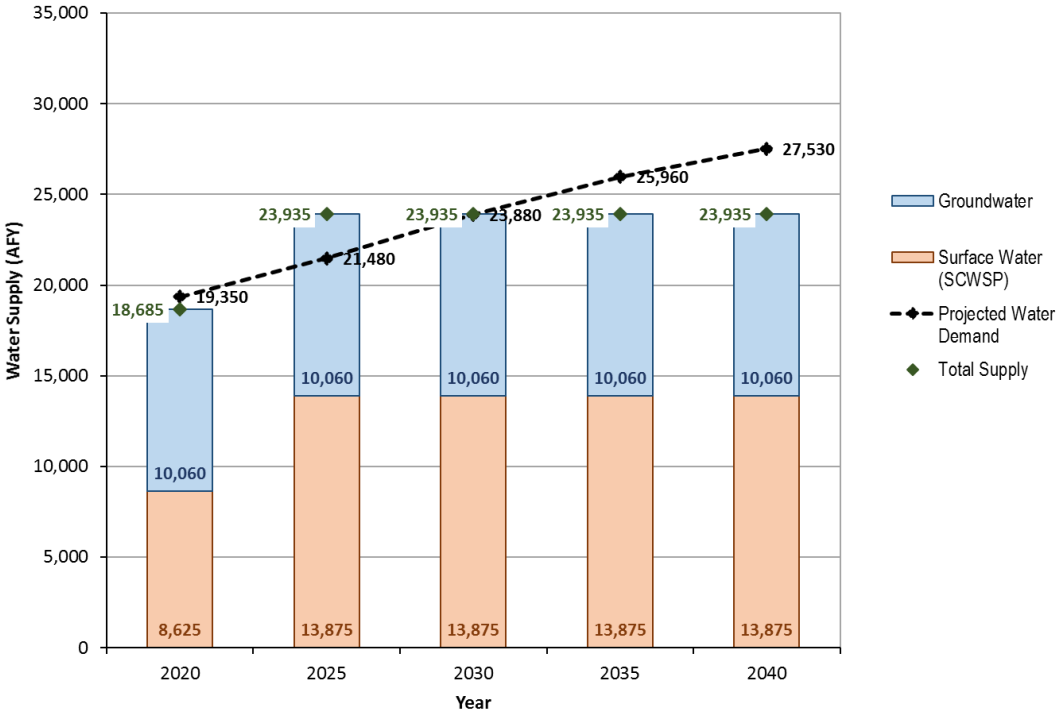


Figure 7-3. City of Manteca Future Potable Water Supply vs. Demand in the First Year of Multiple Dry Years

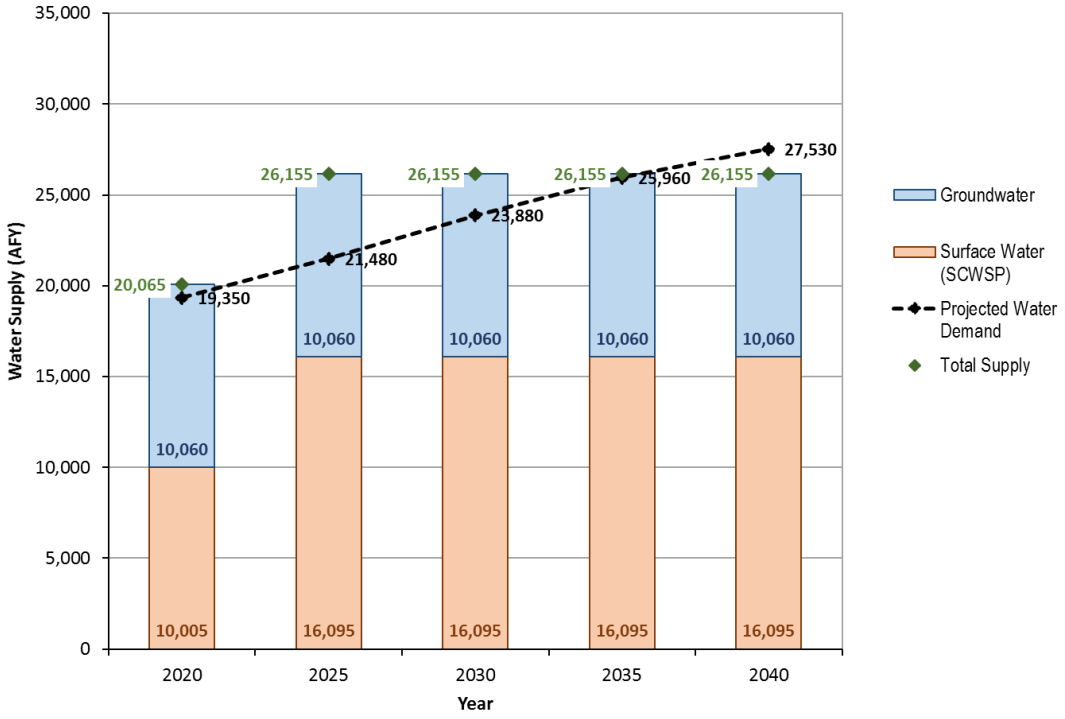


Figure 7-4. City of Manteca Future Potable Water Supply vs. Demand in the Second Year of Multiple Dry Years

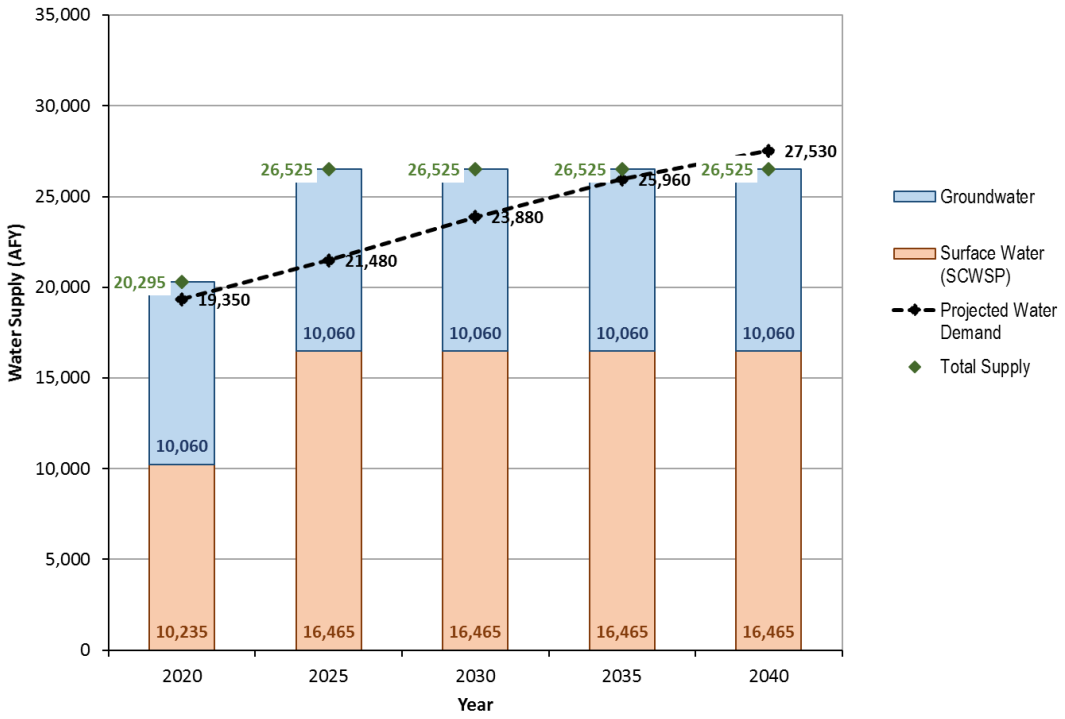
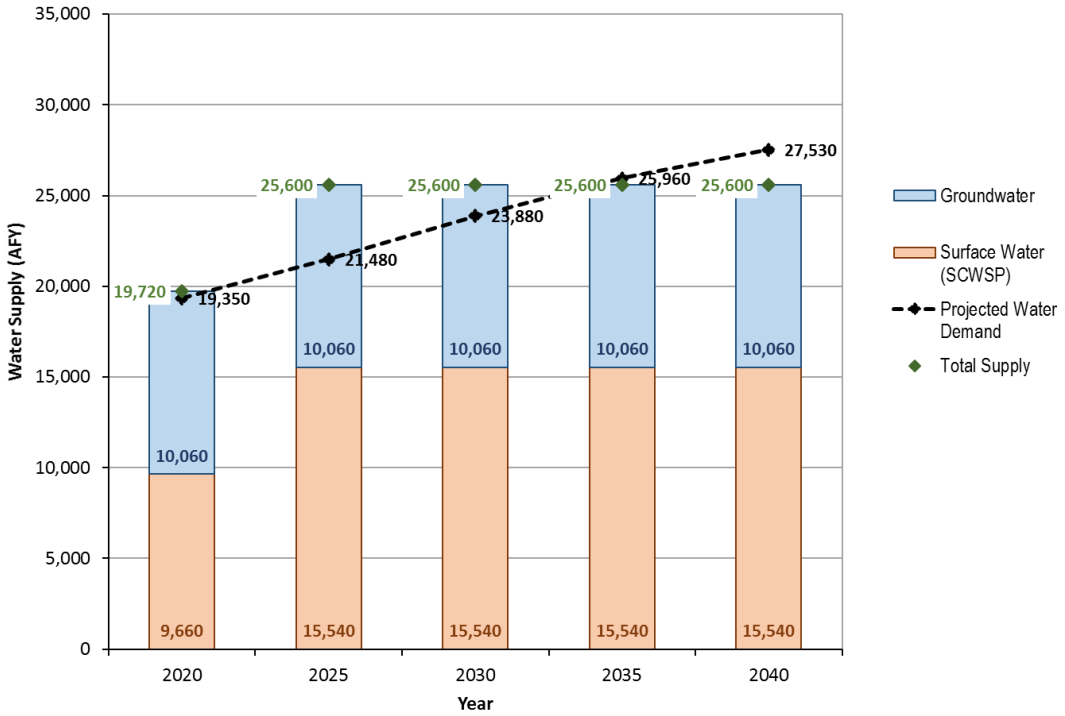


Figure 7-5. City of Manteca Future Potable Water Supply vs. Demand in the Third Year of Multiple Dry Years



8.0 WATER SUPPLY ASSESSMENT APPROVAL PROCESS

Water Code sections 10910 and 10911 state:

> *10910 (g)(1) Subject to paragraph (2), the governing body of each public water system shall submit the assessment to the city or county not later than 90 days from the date on which the request was received. The governing body of each public water system, or the city or county if either is required to comply with this act pursuant to subdivision (b), shall approve the assessment prepared pursuant to this section at a regular or special meeting.*
>
> *10911 (b) The city or county shall include the water supply assessment provided pursuant to Section 10910, and any information provided pursuant to subdivision (a), in any environmental document prepared for the project pursuant to Division 13 (commencing with Section 21000) of the Public Resources Code.*

As indicated above, this WSA must be included in the Draft EIR being prepared for the Project.

In addition, SB 221 applies to residential subdivisions of over 500 dwelling units and requires that the water supplier provide a written verification that the water supply for the project is sufficient, prior to issuance of the final permits. Because the Project includes 1,265 residential dwelling units, it is subject to the requirements of SB 221 (Government Code section 66473.7).

9.0 REFERENCES

California Department of Water Resources (DWR), Bulletin 118, *California's Groundwater*, 2006 Update.

City of Manteca 2015 Final Urban Water Management Plan, September 2016.

City of Manteca 2005 Water Master Plan, May 2005.

City of Manteca General Plan 2023, adopted on October 6, 2003

De Novo Planning Group, 2016. *Notice of Preparation for Oakwood Landing – Cerri & Denali Subdivisions*, August 2016, Manteca, CA.

South San Joaquin Irrigation District 2015 Urban Water Management Plan, 2016.

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APPENDIX A

Preliminary Water Calculations

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Preliminary Water Calculations

Assumptions	Acronym	Units per Acre	Water Duty Factor (AFY/UNIT)
Low Density Residential	LDR	5.05	0.50
High Density Residential	HDR	18	0.32

Project Name	Remaining Lots	General Plan Land Use Category	Water Duty Factor (AFY/units)	Water Demand - AFY	New Water Demand (AFY) 2015 - 20	2020-25	2025-30	2030-35	2035-40	Total	Total Demand[1], AFY
Finished Lots (Approved Final Major, Ready to Build)											
Atherton Home at Woodward Parl	101	LDR	0.50	50	50					50	60
Blossom Grove (Silva Estates)	68	LDR	0.50	34	34					34	41
Crivello Estates Unit No. 1	1	LDR	0.50	0	0					0	1
Dutra Estates Unit No. 5	23	LDR	0.50	11	11					11	14
Evans Estates Unit No. 2	139	LDR	0.50	69	69					69	83
Milner Terrace Unit No. 2	76	LDR	0.50	38	38					38	45
Monte Bello Estates Unit No. 2	109	LDR	0.50	54	54					54	65
Oleander Estates Unit No. 1	7	LDR	0.50	3	3					3	4
Oleander Estates Unit No. 3	119	LDR	0.50	59	59					59	71
Pillsbury Estates Unit No. 1	3	LDR	0.50	1	1					1	2
Pillsbury Estates Unit No. 2	1	LDR	0.50	0	0					0	1
Pillsbury Estates Unit No. 3	8	LDR	0.50	4	4					4	5
Pillsbury Estates Unit No. 4	5	LDR	0.50	2	2					2	3
Union Ranch Units No. 1-3 (Pulte)	15	LDR	0.50	7	7					7	9
Union Ranch Units No. 6 (Pulte)	3	LDR	0.50	1	1					1	2
Union Ranch Units No. 8 (Pulte)	55	LDR	0.50	27	27					27	33
	733				364					364	437
Entitled Lots (approved Tentative Map, Pending Filing Map)											
Atherton @ Wodwrd Park I	70	LDR	0.50	35	35					35	42
Atherton @ Wodwrd Park II	185	LDR	0.50	92		92				92	110
Austin Road	2,358	LDR	0.50	1,172					1172	1172	1,406
Crivello Estates Unit 2	33	LDR	0.50	16			16			16	20
Dejong Estates	352	LDR	0.50	175			175			175	210
Evans Estates	439	LDR	0.50	218	109	109				218	262
Lundbom	18	LDR	0.50	9			9			9	11
Oleander Estates	304	LDR	0.50	151	151					151	181
Shadowbrook	492	LDR	0.50	244	73	171				244	293
Sundance	514	LDR	0.50	255	128	128				255	306
Terra Ranch	212	LDR	0.50	105			105			105	126
Trails of Manteca	1,163	LDR	0.50	578				578	595	1173	1,408
Union Ranch	171	LDR	0.50	85	85					85	102
Villa Ticino West	760	LDR	0.50	378		378				378	453
Woodward Estates	72	LDR	0.50	36	36					36	43
	7,143		**Entitled Demand - AF-Yr**		981	877	306	578	1,767	4,144	4,973
			Planned Supply - Growth Capacity		2,098	1,440	1,630	1,810	2,040		
			Cumulative Excess / (shortage)		1,117	1,680	3,004	4,236	4,509		
Subdivision Projects Under Application											
Oakwood Landing - Cerri[2]	645	LDR	0.50	320				320		320	385
Oakwood Landing - Denali[2]	315	LDR	0.50	157					157	157	188
Dolcinea	40	LDR	0.50	20		20				20	24
Griffin Park	1,592	LDR	0.50	791			395	395		791	949
Hat Ranch	800	LDR	0.50	397					397	397	477
Oakwood Trails	676	LDR	0.50	336				336		336	403
Marini Complex	6	LDR	0.50	3			3			3	4
Copper Cove/Yosemite		LDR		-					740	740	888
	4,074					20	398	1,052	1,294	2,764	3,317
	11,950		Cumulative Excess / (shortage)		1,117	1,660	2,586	2,766	1,745		
										6,908	
Other Developments											
Northwest Airport Way		LDR		-		281				281	
					6,658	6,855	8,628	12,072	14,416	21,735	
Finished Apt Units (Approved site plan, Ready to Build)											
Alma Apts	184	HDR	0.32	60		60				60	71
Austin Road Business Park	1,840	HDR	0.32	595					595	595	715
Senior Housing Apt	48	HDR	0.32	16	16					16	19
Terra Ranch Apts	200	HDR	0.32	65			65			65	78
Tesoro Apts	148	HDR	0.32	48		48				48	57
Trails of Manteca	300	HDR	0.32	97				97		97	116
Vista Verde Apts	19	HDR	0.32	6	6					6	7
Villa Capri Apts	8	HDR	0.32	3	3					3	3
Woodbridge Apts	172	HDR	0.32	56	56					56	67
	2,919				80	107	65	97	595	945	1,133

[1] Total demand assumes an additional 20% to account for UAFW, Parks, and Open Space water demands

[2] The water demands for Oakwood Landing are based on information from the City planning department and have not been updated to reflect the most recent Project Description found in the August 2016 Notice of Preparation and used in the Oakwood Landing Water Supply Assessment.

Appendix G

Oakwood Trails Wetland Delineation

Preliminary Wetland Delineation
Oakwood Trails Subdivision
Manteca, San Joaquin County, Ca.

April 14, 2016

Prepared for:

City of Manteca
1001 West Center Street
Manteca, CA 95337
(209) 456-8511

Prepared by:

De Novo Planning Group
1020 Suncast Lane, Suite 106
El Dorado Hills, CA 95762
(916) 580-9818

De Novo Planning Group

A Land Use Planning, Design, and Environmental Firm

PRELIMINARY WETLAND DELINEATION
OAKWOOD TRAILS SUBDIVISION
MANTECA, SAN JOAQUIN COUNTY, CA.

APRIL 14, 2016

Prepared for:

City of Manteca
Community Development Department
1001 West Center Street
Manteca, CA 95337
(209) 456-8511

Prepared by:

De Novo Planning Group
1020 Suncast Lane, Suite 106
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METHODOLOGY

APPROACH

The Delineation of Jurisdictional Waters and Wetlands that is reported in this document was conducted in accordance with regulations set forth in 33 Code of Federal Regulations (CFR) Part 328 and the USACE guidance documents referenced below:

- USACE Wetlands Research Program Technical Report Y-87-1, Wetlands Delineation Manual, Environmental Laboratory, 1987 (Wetland Manual).
- USFWS Classification of Wetlands and Deepwater Habitats of the United States, Lexis M. Cowardin, U.S. Department of Interior, Fish and Wildlife Service, FWS/OBS-79/31, December 1979, updated 1992 (Cowardin).
- USACE Jurisdictional Determination Form Instruction Guidebook, 2007.
- USACE Minimum Standards for Acceptance of Preliminary Wetlands Delineations, November 30, 2001 (Minimum Standards).
- USACE Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)
- USACE Jurisdictional Determination Form Instructional Guidebook, May 30, 2007 (JD Form Guidebook).
- USACE Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States, July 2010.
- Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States and Carabell v. United States (June 5, 2007) (Rapanos Guidance).
- USACE A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the United States, August 2008 (OHWM Manual).
- USACE Regulatory Guidance Letter No. 07-02; Exemptions for Construction or Maintenance of Irrigation Ditches and Maintenance of Drainage Ditches Under Section 404 of the Clean Water Act, July 4, 2007 (Irrigation Ditch Guidance)

PRE-FIELD INVESTIGATION

Prior to the field investigation several maps were reviewed to identify drainage features within the Project site, as indicated from topographic changes or visible drainage patterns. The maps include the Lathrop, California, U.S. Geological Survey (USGS) 7.5-minute Quadrangle, USGS National Hydrography Data Set, Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps, National Resource Conservation Service (NRCS) Soil Survey, and aerial photos. Additionally, the NRCS Soil Survey was reviewed to identify all soil series that occur within the Project site.

FIELD INVESTIGATION

2015 Field Surveys

Field surveys and habitat evaluations were performed on March 13, 2015, April 10, 2015, and September 29, 2016 by Steve McMurtry. All surveys were conducted on foot. Potential

jurisdictional features were systematically inspected to record existing conditions and to determine the potential for jurisdiction. The Project site was assessed carefully for surface flow indicators (presence of hydrophytic vegetation, staining, cracked soil, ponding, etc.). The apparent flow regimes and corresponding hydrogeomorphic features were subsequently identified.

It was determined from field surveys that the project site contains six irrigation ditches that serve as a runoff catch basin for upland agricultural lands. These irrigation ditches are located along the northern and southern boundaries of the project site. These irrigation ditches serve to catch agricultural irrigation runoff during the irrigation season, which runs from approximately March 15 to October 15, depending on the weather. These irrigation ditches are manmade, are regularly maintained, are not connected to the SSJID irrigation canal system, and do not have downstream connectively to a "Traditional Navigable Water" (TNW). There is no anadromous fish movement within the irrigation ditches. It was preliminarily determined by Steve McMurtry that these irrigations ditches are not jurisdictional for the reasons provided above. A request was made to the USACE for concurrence that no permit is required on 10/19/15; however, the USACE requested additional field work (soil sampling) in a few areas that show wetland features on historical USGS maps.

On December 30, 2015 Steve McMurtry performed the additional field work requested by the USACE. The field work involved testing and recording soil data in three locations (within USGS wetland features) and at a control location on the project site that was approximately 1,000 feet to the northwest of the USGS wetland feature. The results were submitted to the USACE and a field verification by the USACE was requested.

On January 29, 2016 a field verification survey with Ramon Aberasturi from the USACE was performed with Steve McMurtry. The purpose of the field verification was to evaluate two soil classes in the southwestern corner of the project site that is classified as a hydric soil (Guard clay loam, drained, 0 to 2 percent slopes and Dello loamy sand, drained, 0 to 2 percent slopes). Hydric indicators were found within these soils and the USACE requested an additional survey to map the extent of the hydric soils on the site. It was also requested to map the irrigation ditch profile.

On April 14, 2016, Steve McMurtry performed the additional field work requested by the USACE.

REGIONAL SETTING

PROJECT LOCATION

The Project site is located in the City of Manteca, San Joaquin County, California (Figure 1 Regional Location Map). The Project site is located on the Lathrop, California, USGS 7.5-minute quadrangle (Figure 2). The Project site is within a Land Grant area. The Lat/Long coordinates are 37.7817504494 N, -121.27838943200 W (WGS 84, decimal degrees). Figure 3 provides an aerial view of the Project site.



OAKWOOD TRAILS EIR

Figure 1: Regional Context/Location

N

0 10 20

Miles

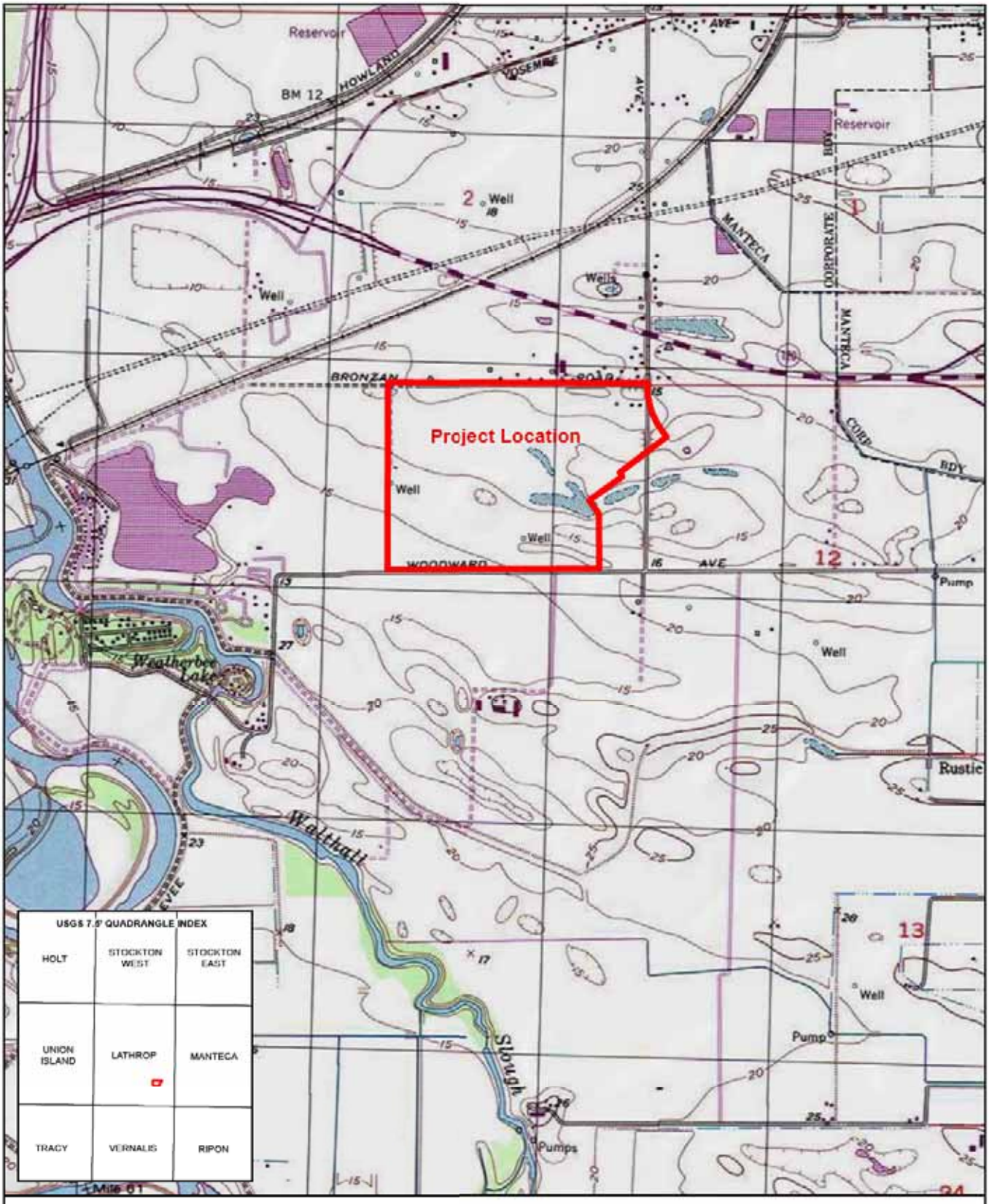
1:1,250,000

Data source: California Spatial Information Library Map date: October 8, 2014.

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OAKWOOD TRAILS EIR

Figure 2: USGS Topographic Map

Sources: San Joaquin County GIS; ArcGIS Online
opographic Map Service. Map date: October 9, 2014.

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OAKWOOD TRAILS EIR

Figure 3: Aerial View of Project Site

N

0 450 900

Feet

Sources: San Joaquin County GIS; ArcGIS Online Imagery Map Service. Map date: October 8, 2014.

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The project site is located along the southwestern quadrant of the City of Manteca, California, in San Joaquin County. The project site is located south of SR 120, approximately four miles southwest of downtown Manteca adjacent to the Oakwood Shores neighborhood.

The project site comprises approximately 206.7 acres of land bounded by Rapallo Way and Bronzan Road to the north, McKinley Avenue to the east, Woodward Avenue to the south, and Bella Lago Way and Como Drive to the west. The project site encompasses four parcels (APNs 241-260-260-020, 241-260-070, 241-260-030, 241-320-47).

Directions to the Project Site

From SR-120 west, exit at the South Airport Way off ramp and travel south. Turn right on Woodward Avenue and travel for approximately one mile to the southeastern corner of the Project site.

ENVIRONMENTAL CONDITIONS

Topography

The project site has been leveled for agricultural uses. Topographic features within the project site include level agricultural fields, farm roads, and irrigation ditches/catch basins. Elevation ranges from approximately 15 feet to 20 feet above mean sea level (MSL).

Climate

The City of Manteca is located in the northern portion of the San Joaquin Valley, which has a Mediterranean climate that is subject to cool, wet winters (often blanketed with fog) and hot, dry summers. The average annual precipitation is approximately 13.81 inches. Precipitation occurs as rain most of which falls between the months of November through April, peaking in January at 2.85 inches. The average temperatures range from December lows of 37.5 F to July highs of 94.3 F.

Field Conditions at time of the 2015 and 2016 Field Investigations

The Central Valley of California was experiencing moderate to extreme drought conditions from January 2013 through November 2015. Table 1 provides meteorological information for the 2013-2015 calendar years.

TABLE 1: LONG-TERM METEOROLOGICAL CONDITIONS 2013-2015

DATE	PALMER SEVERITY INDEX
January-February-2013	Moderate Drought
March - April -2013	Severe Drought
May - September-2013	Extreme Drought
October-2013	Severe Drought
November 2013 – November 2015	Extreme Drought

SOURCE: NOAA PALMER DROUGHT SEVERITY INDEX LONG-TERM HYDROLOGICAL CONDITIONS, (2015)

Soils

The USDA/NRCS Web Soil Survey indicates the presence of five soil series occurring within the project site. Table 3.4-1 identifies the soils found on the project site. The NRCS Soils Map is provided in Figure 4.

TABLE 3.4-1: USDA SOIL SERIES INFORMATION

UNIT SYMBOL	NAME	ACRES IN AOI	PERCENT OF AOI
108	Arents, saline-sodic, 0 to 2 percent slopes	128	62.1
145	Dello loamy sand, drained, 0 to 2 percent slopes	25.6	12.4
166	Grangeville fine sandy loam, partially drained, 0 to 2 percent slopes	16.8	8.1
169	Guard clay loam, drained, 0 to 2 percent slopes	21.7	10.5
255	Tinnin loamy coarse sand, 0-2% slopes	14.1	6.8

SOURCE: NRCS CUSTOM SOIL SURVEY 2015

Arents, saline-sodic. This series consist of somewhat poorly drained soils in areas on low alluvial fans or terraces where ripping, cutting, or filling has altered the landscape. These soils are moderately deep or deep to a hardpan or are very deep. They formed in alluvium derived from mixed rock sources. Slope ranges from 0 to 2 percent. Arents, saline-sodic, 0 to 2 percent slopes is included on the NRCS National Hydric Soils List. This soil is listed a low percentage hydric.

The A horizon has a grayish brown (10YR 5/2) and brown (10YR 5/3) sandy loam and loam, dark grayish brown (1 OYR 4/2) and dark brown (1 OYR 4/3) moist; massive; hard or very hard, firm, slightly sticky and slightly plastic; many very fine roots; common very fine and fine interstitial pores; 2 percent hardpan fragments; saline-sodic; slightly effervescent to violently effervescent; mildly alkaline to strongly alkaline; clear smooth boundary.

The B and C horizon are from 10 to 40 inches and are light brownish gray (10YR 6/2 and 2.5Y 6/2), pale brown (1 OYR 6/3), and yellowish brown (10YR 5/4 and 5/6), mottled loam and clay loam, grayish brown (10YR 5/2 and 2.5Y 5/2), brown (10YR 5/3), dark brown (10YR 4/3), dark grayish brown (1 OYR 4/2 and 2.5Y 4/2), and olive brown (2.5Y 4/4) moist; massive; hard or very hard, firm, sticky and plastic; common very fine roots; common very fine and fine pores; salinesodic; 10 percent hardpan fragments; slightly effervescent to violently effervescent; mildly alkaline to strongly alkaline; diffuse broken boundary.

Dello loamy sand. This series consist of very deep, very poorly drained soils that formed in alluvium from granitic rock sources. Dello soils are in small depressions and have slopes of 0 to 2 percent. The mean annual precipitation is about 12 inches and the mean annual temperature is about 63 degrees F. Dello loamy sand, 0 - 2% slopes is included on the NRCS National Hydric Soils List. This soil is listed a high percentage hydric.

The A horizon has dry color of 10YR 4/2, 4/3, 4/4, 5/2, 5/3, 6/2, 6/3, or 6/4; 2.5Y 6/2, 5/2, 4/2; 5Y 5/2, and moist color of 10YR 4/4, 4/3, 4/2; 2.5Y 4/2; 5Y 4/2. It is neutral to moderately alkaline. The texture is sand, loamy fine sand, loamy sand, sandy loam or fine sand. Most pedons have distinct or prominent mottles or a clay loam overwash texture.



OAKWOOD TRAILS EIR

Figure 4: Soils Map

Sources: San Joaquin County GIS; USDA NRCS Web Soil Survey, San Joaquin County, California (CA077). Map date: February 4, 2015.

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The Cg horizon has dry color of 10YR 5/3, 6/2, 6/3, 6/4, 6/6, 7/2, 7/3, 8/2 or 8/3; 5Y 6/1; 2.5Y 8/2, 7/2, 6/2 and moist color of 10YR 5/2, 5/4, 6/2, 6/3, 6/4 or 7/2; 2.5Y 5/2, 6/2, 7/2. Mottles are faint, distinct or prominent. It is neutral to moderately alkaline. The textural control section between the depth of 10 to 40 inches is sand, loamy sand, fine sand or loamy fine sand. Fine stratification is present, but individual strata are evidenced primarily by minor color differences. In some pedons the lower C horizon (below 40 inches) have stratified silty clay to clay loam lenses.

Grangeville fine sandy loam. This series consists of very deep, somewhat poorly drained soils that formed in moderate coarse textured alluvium dominantly from granitic rock sources. Grangeville soils are on alluvial fans and floodplains and have slopes ranging from 0 to 2 percent. The mean annual precipitation is about 12 inches and the mean annual temperature is about 63 degrees F. Grangeville fine sandy loam, partially drained, 0 to 2 percent slopes is included on the NRCS National Hydric Soils List. This soil is listed a low percentage hydric.

The A horizon has dry color of 10YR 4/1, 4/2, 4/3, 5/1, 5/2, 5/3, 6/2; 2.5Y 5/2, 4/2; 5Y 4/1 or 4/2 and moist color of 10YR 2/1, 2/2, 3/1, 3/2, 3/3; 2.5Y 3/2, 3/3; 5Y 3/1 or 3/2. It is sandy loam, very fine sandy loam, fine sandy loam, light loam, silt loam, or clay loam. The A horizon is slightly acid to moderately alkaline and slightly alkaline to very strongly alkaline in saline-sodic phases. Some pedons are effervescent at the surface. In saline-sodic phases the sodium adsorption ratio is always less than 13 in this horizon.

The B horizon has dry color of 10YR 5/2, 6/2, 6/3, 7/2, 7/3; 2.5Y 6/2, 5/2; 5Y 5/1, 5/2, 6/2 or 6/3. Faint to prominent redoximorphic masses of iron are present. This horizon is sandy loam, fine sandy loam, light loam or light silt loam. It has weak structure or is massive. It is neutral to moderately alkaline and slightly alkaline to very strongly alkaline in saline-sodic phases. In most pedons, some or all of this horizon is calcareous with carbonates mostly disseminated, but in some pedons fine carbonate segregations are present. Carbonates range from 0 to 5 percent. In some pedons the B horizon is absent.

The C horizon is similar to the B horizon in most features but includes dry color of 10YR 8/1, 7/2, 6/2, 5/4, 5/3, or 5/2; 2.5Y 7/2; 5Y 5/1, or 6/1 and moist color of 5Y 4/1, 4/2, 5/1, 5/2; 2.5Y 4/2, 5/2; 10YR 3/2, 3/3, 4/2, 4/3, 5/2, 5/3 or 7/1. It is stratified loamy sand to silt loam, clay content is 8 to 18 percent, and colors are very variable. It is neutral to strongly alkaline and slightly alkaline to very strongly alkaline in saline-sodic phases. Carbonates usually decrease from the B horizon but always by less than 5 percent.

Guard clay loam. This series consists of very deep, poorly drained soils formed in alluvium from mixed sources. Guard soils are on basin rims of the San Joaquin Delta and have slopes of 0 to 2 percent. The mean annual precipitation is 14 inches and the mean annual temperature is 60 degrees F. Guard clay loam, drained, 0 to 2 percent slopes is included on the NRCS National Hydric Soils List. This soil is listed a high percentage hydric.

The A horizon has dry color of 10YR 5/1, 5/2, 4/1, 4/2; N 5/0, or N 4/0 and moist color of 10YR 2/1, 3/1, 3/2; N 2/0, or N 3/0. Mottles are distinct or prominent in the lower part. It is clay loam or sandy clay loam with 2 to 5 percent organic matter.

The Bkq horizon has dry color of 10YR 7/1, 6/1, 6/2, 6/3, 6/4, 5/1, 5/2, 5/3, 5/4; 5Y 7/2, 6/2, 4/1; N 7/0, or N 6/0 and moist color of 10YR 6/1, 5/1, 5/2, 4/2; 5Y 5/1, 4/1; N 5/0, or N 4/0. Mottles are distinct or prominent. The amount of durinodes increases with depth but never becomes a duripan within 80 inches. It is clay loam or sandy clay loam.

Tinnin loamy coarse sand. The Tinnin series consists of very deep, well drained soils formed in predominantly granitic alluvium or eolian sands. Tinnin soils are on low alluvial terraces of fans and narrow ridges and mounds and have slopes of 0 to 9 percent. This series is typically a Mollic epipedon. Tinnin loamy coarse sand, 0 - 2% slopes is not included on the NRCS National Hydric Soils List.

The color range for A horizon (0-28 inches) is 10YR 5/2, 5/3, 4/2, or 4/3 and 10YR 2/2, 3/2 or 3/3 moist. It is loamy coarse sand, loamy sand, fine sand or sand. It is slightly acid to mildly alkaline. This horizon has 1 to 3 percent organic matter.

The color range for the C horizon (28-75 inches) is 10YR 4/4, 5/3, 5/4, 6/2, 6/3, 6/4, 7/2, 7/3 or 7/4, and moist color of 10YR 5/4, 5/3, 4/4, 4/3, 4/2, 3/3 or 3/4. It commonly is loamy coarse sand or loamy sand, but includes sand in the lower part of some pedons. The upper C horizon is slightly acid to mildly alkaline, and the lower C horizon is neutral to moderately alkaline.

Vegetation

Vegetation on the project site can be broken up into upland and irrigation ditch communities in the undeveloped portion of the Project site, as well as urban landscaping in the existing developed area surrounding the house. Because of the active agricultural use, there is very limited vegetation on the project site with the exception of the perimeter of the agricultural fields. Common plant species observed in these areas include: wild oat (*Avena barbata*), rip-gut brome (*Bromus diandrus*), softchess (*Bromus hordeaceus*) alfalfa (*Medicago sativa*), Russian thistle (Salsola tragus), Italian thistle (*Carduus pycnocephalus*), rough pigweed (*Amaranthus retroflexus*), sunflower (*Helianthus annuus*), tarragon (*Artemisia dracunculus*), coyote brush (*Baccharis pilularis*), telegraphweed (*Heterotheca grandiflora*), prickly lettuce (*Lactuca serriola*), milk thistle (*Silybum marianum*), sow thistle (*Sonchus asper*), telegraph weed (*Heterotheca grandiflora*), prickly lettuce (*Lactuca serriola*), barley (*Hordeum* sp.), milkthistle (*Silybum marianum*), mustard (*Brassica niger*), and heliotrope (*Heliotropium curassavicum*).

The irrigation ditch also has very limited vegetation due to the ongoing weed abatement program for these ditches. Common plant species in the irrigation ditches include: hyssop loosestrife (*Lythrum hyssopifolia*), curly dock (*Rumex crispus*), stinging nettles (*Urtica dioica*), willow herb (*Epilobium brachycarpum*), horseweed (*Conyza canadensis*), Canadian waterweed (*Elodea canadensis*), prickly lettuce (*Lactuca serriola*), spiny sowthistle (*Sonchus asper*), horehound (*Marrubium vulgare*), cocklebur (*Xanthium strumarium*), and yellow sweetclover (*Melilotus officinalis*).

HYDROLOGY

Watershed Description

San Joaquin County is located in the San Joaquin River Hydrological Region. The San Joaquin River is the principal river of the region, and all other streams of the region are tributary to it. The Mokelumne River and its tributary the Cosumnes River originate in the central Sierra Nevada, along with the more southerly Stanislaus and Tuolumne rivers. The Merced River flows from the south central Sierra Nevada and enters the San Joaquin near the City of Newman. The Chowchilla and Fresno rivers also originate in the Sierra south of the Merced River and trend westward toward the San Joaquin River. Creeks originating in the Coast Range and draining eastward into the San Joaquin River include Del Puerto Creek, Orestimba Creek, and Panoche Creek. Del Puerto Creek enters the San Joaquin near the City of Patterson, and Orestimba Creek enters north of the City of Newman. During flood years, Panoche Creek may enter the San Joaquin River or the Fresno Slough near the town of Mendota. The Kings River is a stream of the Tulare Lake Hydrologic Region, but in flood years it may contribute to the San Joaquin River, flowing northward through the James Bypass and Fresno Slough to enter near the City of Mendota. The Mud, Salt, Berrenda, and Ash sloughs also add to the San Joaquin River, and numerous lesser streams and creeks also enter the system, originating in both the Sierra Nevada and the Coast Range. The entire San Joaquin river system drains northwesterly through the Delta to Suisun Bay (DWR 2013, pg. SJR-5).

The City of Manteca and much of the surrounding area is located in the Eastern San Joaquin River Subbasin. This groundwater basin covers approximately 1,105 square miles and extends from the Mokelumne River on the north and northwest; San Joaquin River on the west; Stanislaus River on the south; and consolidated bedrock on the east. The Eastern San Joaquin Subbasin is bounded on the south, southwest, and west by the Modesto, Delta-Mendota, and Tracy Subbasins, respectively and on the northwest and north by the Solano, South American, and Cosumnes Subbasins. The Solano and South American are subbasins of the Sacramento Valley Groundwater Basin (DWR 2006, pg. 1). The Project site is located in the Oakwood Lake - San Joaquin River watershed. See Figure 5. Watershed information is summarized in Table 4.

TABLE 4: WATERSHED INFORMATION

HYDROLOGIC INFORMATION	DESCRIPTION	ACRES	SQUARE MILES	PERCENT OF WATERSHED
Hydrologic Unit	Middle San Joaquin - Lower Merced - Lower Stanislaus	1,130,757	1,766.80	100
Hydrologic Area	Manteca	84,980	133	7.515
Hydrologic Sub-Area	"Undefined" Sub-Area -535.1	NA	NA	NA
Drainage Area (D5)	Undetermined	NA	NA	NA

SOURCE: CALWATER 2.1.1, NATIONAL RESOURCES CONSERVATION SERVICE, IWMC.

Hydrogeomorphic Features

The project site contains six irrigation ditches that serve as a runoff catch basin for upland agricultural lands. These irrigation ditches are located along the northern and southern boundaries of the project site. These irrigation ditches serve to catch agricultural irrigation runoff during the irrigation season, which runs from approximately March 15 to October 15, depending on the weather. These irrigation ditches are manmade, are regularly maintained, are not connected to the SSJID irrigation canal system, and do not have downstream connectively to a "Traditional Navigable Water" (TNW). There is no anadromous fish movement within the irrigation ditches.

The remainder of the Project site is level agricultural property with agricultural roads and ancillary structures. There are no hydrological features on the remainder of the Project site. The agricultural fields are actively maintained in crops during the growing season.

Water Source

The topography of the Project site is relatively flat with an approximate six-foot elevation gain throughout the Project site (west to east). There are no natural water courses in the Project site. Two irrigation water wells are located in the western and south-central portions of the project site, with catch ponds along the north, and south sides of the project site. The project site is farmed on a contract basis, most recently planted with alfalfa. Irrigation season runs from approximately March 15 to October 15, depending on the weather. The Project site is in the Oakwood Lake - San Joaquin River watershed, which is part of the San Joaquin River watershed.

Drainage Pattern

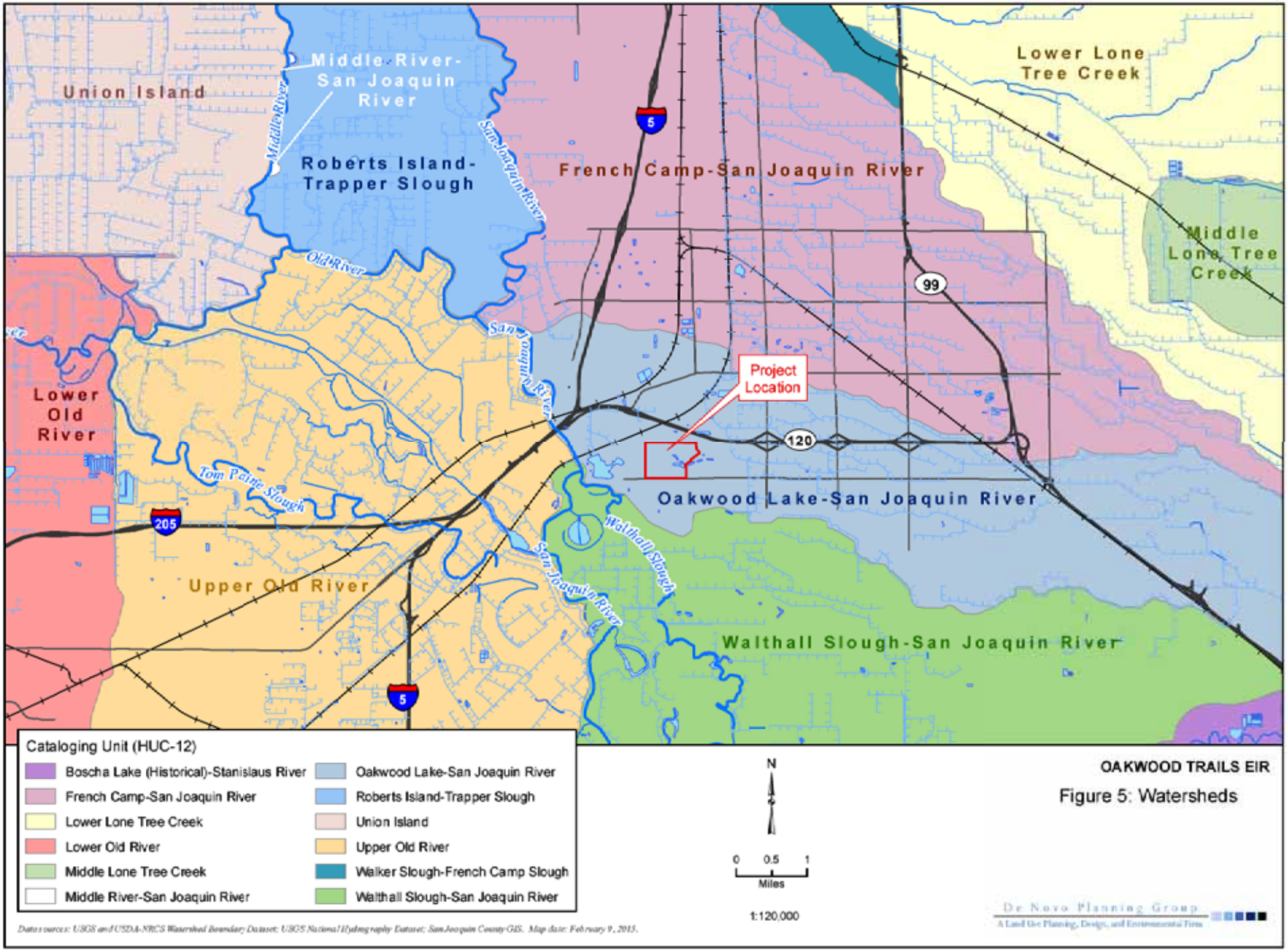
The region and project site generally drains from east to west and north to south. The natural drainage pattern in the area, and project site, is largely changed from its natural conditions due to agricultural activities. There are no natural drainage patterns within the Project site.

Downstream Connectivity

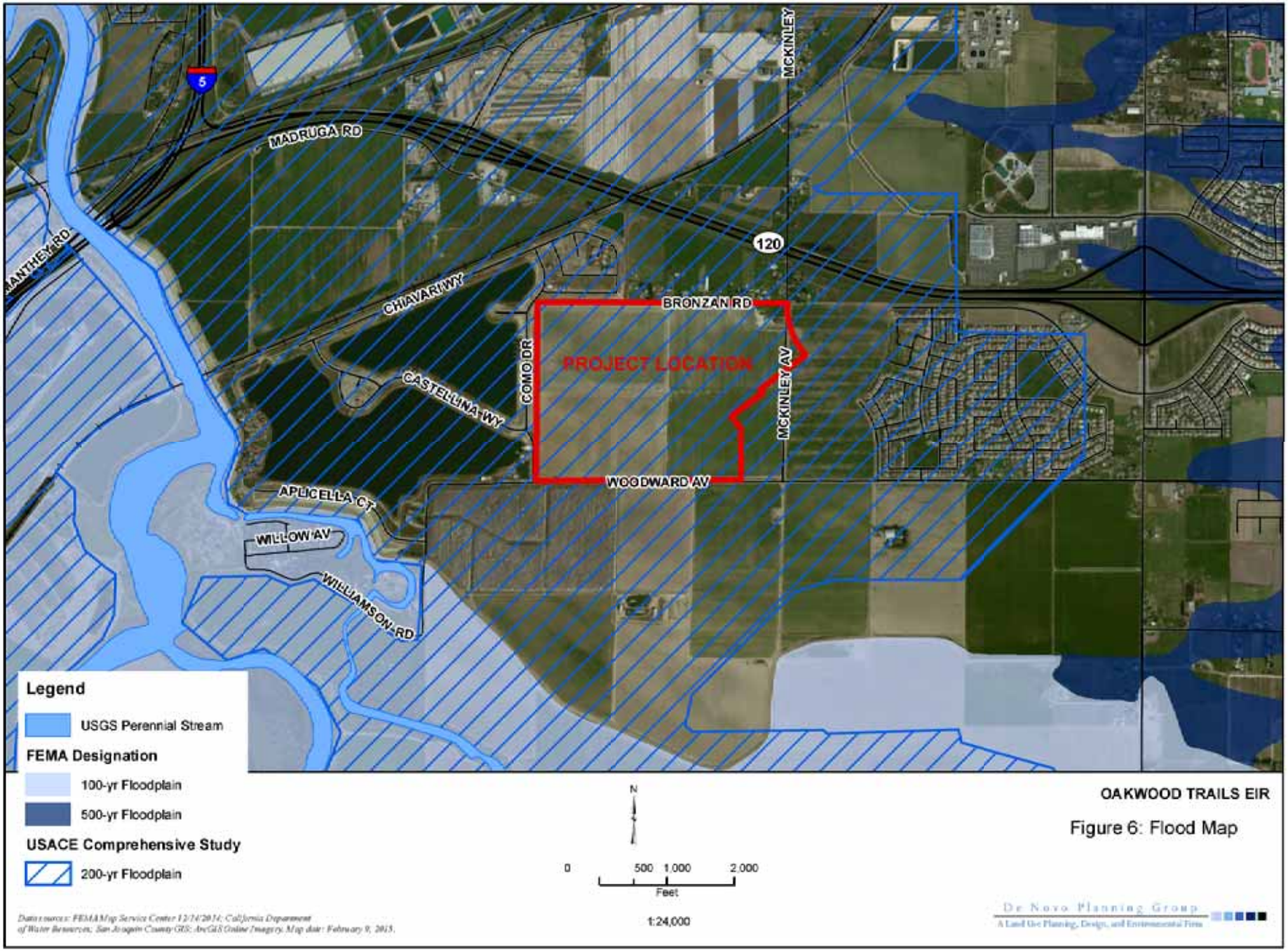
The project site contains six irrigation ditches that serve as a runoff catch basin for upland agricultural lands. These irrigation ditches are located along the northern and southern boundaries of the project site. These irrigation ditches serve to catch agricultural irrigation runoff during the irrigation season, which runs from approximately March 15 to October 15, depending on the weather. These irrigation ditches are manmade, are regularly maintained, are not connected to the SSJID irrigation canal system, and do not have downstream connectively to a "Traditional Navigable Water" (TNW). There is no anadromous fish movement within the irrigation ditches.

FEMA Flood Map

The Project site lies within the larger area known as the Delta Basin, which historically was a tidal marsh formed in an overflow area of the Sacramento and San Joaquin Rivers. During the early part of the 20th century, over 80 percent of the Delta was reclaimed through construction of levees. There are over 1,100 miles of man-made levees protecting land in the Delta from flooding. The RD-17 levee system is designed to a 100-year protection standard. The Project site is currently located in Zone X, protected by levee, which by definition indicates an area protected by levees from the 1% annual chance flood. However, the project site is located within the 200-year floodplain as delineated by the USACE. Figure 6 shows the flood boundaries as delineated by the FEMA FIRM and USACE.


Union Island
Middle River-San Joaquin River
Middle River
Roberts Island-Trapper Slough
San Joaquin River
French Camp-San Joaquin River
Lower Lone Tree Creek
Middle Lone Tree Creek
Old River
99
Project Location
120
Lower Old River
Tom Paine Slough
205
Oakwood Lake-San Joaquin River
Walthall Slough
Upper Old River
Walthall Slough-San Joaquin River
5
Cataloging Unit (HUC-12)
Boscha Lake (Historical)-Stanislaus River
French Camp-San Joaquin River
Lower Lone Tree Creek
Lower Old River
Middle Lone Tree Creek
Middle River-San Joaquin River
Oakwood Lake-San Joaquin River
Roberts Island-Trapper Slough
Union Island
Upper Old River
Walker Slough-French Camp Slough
Walthall Slough-San Joaquin River
N
0 0.5 1
Miles
1:120,000
OAKWOOD TRAILS EIR
Figure 5: Watersheds
Data sources: USGS and USDA-NRCS Watershed Boundary Dataset; USGS National Hydrography Dataset; San Joaquin County GIS. Map date: February 9, 2015.
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A Land Use Planning, Design, and Environmental Firm

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OAKWOOD TRAILS EIR

Figure 6: Flood Map

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RESULTS

SUMMARY

Table 6 provides a summary of USACE delineated features present onsite. Figure 7a through 7f illustrates the hydrological features. In addition, the following information is provided in the attached appendices: Cross Sections, Site Photographs, Wetland data forms, and OHWM forms. A detailed discussion of the rationale for the jurisdictional determination follows. The USACE, with oversight by the Environmental Protection Agency (EPA), will make the final U.S. jurisdictional determination.

TABLE 6: SUMMARY DELINEATED FEATURES

FEATURE	TYPE	AREA (ACRE)	LENGTH (FT)	JURISDICTION (RATIONALE)
Irrigation Ditch #1	Channelized soft-bottom agricultural irrigation ditch.	0.03	301.2	No (Irrigation Ditch Exemption pursuant to Federal Regulations (33 CFR 323.4(a)(3)). Channelized soft-bottom agricultural irrigation ditch created in agricultural uplands for the purpose of draining irrigation.
Irrigation Ditch #2	Channelized soft-bottom agricultural irrigation ditch.	0.02	53.9	No (Irrigation Ditch Exemption pursuant to Federal Regulations (33 CFR 323.4(a)(3)). Channelized soft-bottom agricultural irrigation ditch created in agricultural uplands for the purpose of draining irrigation.
Irrigation Ditch #3	Channelized soft-bottom agricultural irrigation ditch.	0.13	367.0	No (Irrigation Ditch Exemption pursuant to Federal Regulations (33 CFR 323.4(a)(3)). Channelized soft-bottom agricultural irrigation ditch created in agricultural uplands for the purpose of draining irrigation.
Irrigation Ditch #4	Channelized soft-bottom agricultural irrigation ditch.	0.24	712.2	No (Irrigation Ditch Exemption pursuant to Federal Regulations (33 CFR 323.4(a)(3)). Channelized soft-bottom agricultural irrigation ditch created in agricultural uplands for the purpose of draining irrigation.
Irrigation Ditch #5	Channelized soft-bottom agricultural irrigation ditch.	0.28	1,201.3	No (Irrigation Ditch Exemption pursuant to Federal Regulations (33 CFR 323.4(a)(3)). Channelized soft-bottom agricultural irrigation ditch created in agricultural uplands for the purpose of draining irrigation.
Irrigation Ditch #6	Channelized soft-bottom agricultural irrigation ditch.	0.43	1,863.0	No (Irrigation Ditch Exemption pursuant to Federal Regulations (33 CFR 323.4(a)(3)). Channelized soft-bottom agricultural irrigation ditch created in agricultural uplands for the purpose of draining irrigation.
Agricultural Field – USGS Mapped Wetlands	Dry Agricultural Field	0	--	No (There is no evidence of wetlands at present or over the past twenty years.)
Total Delineated Features		*1.12*	*4,498.65*	
Total Jurisdictional Area		**0**	**0**	

SOURCE: DE NOVO PLANNING GROUP, INC., 2016.

RATIONALE

There are six irrigation basins/ditches located within the project boundary. Two are located on the northern boundary, and the other four are located on the southern boundary. These irrigation basins are man-made ditches that function to drain upland agricultural runoff. The total length of the six basins is 4,498.65 feet and the total acreage is 1.12 acres. Because these irrigation basins are manmade and function to drain upland agricultural runoff with no downstream connectivity to jurisdictional waters they are expected to be exempted from the USACE jurisdiction under the Irrigation Ditch Exemption pursuant to Federal Regulations (33 CFR 323.4(a)(3)). The final determination of jurisdiction is subject to the regulatory agencies. The project applicant must consult with the USACE to ensure that the regulatory agency concurs that the fill activities of these basins is exempt.

Irrigation Basin/Ditch #1

UPSTREAM/DOWNSTREAM CONNECTIVITY – NO CONNECTIVITY

Irrigation Basin/Ditch #1 is located on the southwestern boundary of the project site. This facility travels east-west for approximately 301.2 feet covering an area of approximately 0.03 acres. This facility has a culvert inlet located on the western end of the ditch. Surface flows within this facility are derived completely from the agricultural field to the north (within the project site), entering at the culvert. There is no drainage from adjacent farms or subdivisions in the area that enter this facility. Irrigation Basin/Ditch #1 does not have any downstream or upstream connectivity to "Traditional Navigable Water" (TNW).

ADJACENT WETLANDS

There are no wetlands within the project site that are adjacent to this facility. Oakwood Lakes is a manmade lake within a residential subdivision located immediately to the west. There is no hydrologic connection between the project site and the man-made Oakwood Lakes. The San Joaquin River is located approximately 5,456 feet to the west of the project site. There is no hydrologic connection between the project site and the San Joaquin River due to the construction of a federal levee system, as well as a non-federal dry levee.

JURISDICTION

Ditches fall under the Irrigation Ditch Exemption pursuant to Federal Regulations (33 CFR 323.4(a)(3)). Specifically, discharges for the construction or maintenance of farm or stock ponds or irrigation ditches have been exempted from requiring a Section 404 permit. This facility specifically does not have upstream or downstream connectivity to a TNW, it is anthropogenically created at the edge of an agricultural field, and there are no adjacent wetlands.

Artificially constructed agricultural irrigation basins/ditches are not regulated under the Fish and Game Code (FGC) §1602.

Irrigation Basin/Ditch #2

UPSTREAM/DOWNSTREAM CONNECTIVITY – NO CONNECTIVITY

Irrigation Basin/Ditch #2 is located on the southern boundary of the project site. This facility travels east-west for approximately 53.9 feet covering an area of approximately 0.02 acres. This facility has culvert inlets and surface flows within this facility are derived completely from the agricultural field to the north (within the project site), entering at these culverts. There is no drainage from adjacent farms or subdivisions in the area that enter this facility. Irrigation Basin/Ditch #2 does not have any downstream or upstream connectivity to "Traditional Navigable Water" (TNW).

ADJACENT WETLANDS

There are no wetlands within the project site that are adjacent to this facility. Oakwood Lakes is a manmade lake within a residential subdivision located immediately to the west. There is no hydrologic connection between the project site and the man-made Oakwood Lakes. The San Joaquin River is located approximately 7,218 feet to the west of the project site. There is no hydrologic connection between the project site and the San Joaquin River due to the construction of a federal levee system, as well as a non-federal dry levee.

JURISDICTION

Ditches fall under the Irrigation Ditch Exemption pursuant to Federal Regulations (33 CFR 323.4(a)(3)). Specifically, discharges for the construction or maintenance of farm or stock ponds or irrigation ditches have been exempted from requiring a Section 404 permit. This facility specifically does not have upstream or downstream connectivity to a TNW, it is anthropogenically created at the edge of an agricultural field, and there are no adjacent wetlands.

Artificially constructed agricultural irrigation basins/ditches are not regulated under the Fish and Game Code (FGC) §1602.

Irrigation Basin/Ditch #3

UPSTREAM/DOWNSTREAM CONNECTIVITY – NO CONNECTIVITY

Irrigation Basin/Ditch #3 is located on the northern boundary of the project site. This facility travels east-west for approximately 367.0 feet cover 0.13 acres. This facility has numerous culvert inlets and surface flows within this facility are derived completely from the agricultural field to the north (within the project site), entering at these culverts. There is no drainage from adjacent farms or subdivisions in the area that enter this facility. Irrigation Basin/Ditch #3 does not have any downstream or upstream connectivity to "Traditional Navigable Water" (TNW).

ADJACENT WETLANDS

There are no wetlands within the project site that are adjacent to this facility. Oakwood Lakes is a manmade lake within a residential subdivision located immediately to the west. There is no hydrologic connection between the project site and the man-made Oakwood Lakes. The San

Joaquin River is located approximately 7,393 feet to the west of the project site. There is no hydrologic connection between the project site and the San Joaquin River due to the construction of a federal levee system, as well as a non-federal dry levee.

JURISDICTION

Ditches fall under the Irrigation Ditch Exemption pursuant to Federal Regulations (33 CFR 323.4(a)(3)). Specifically, discharges for the construction or maintenance of farm or stock ponds or irrigation ditches have been exempted from requiring a Section 404 permit. This facility specifically does not have upstream or downstream connectivity to a TNW, it is anthropogenically created at the edge of an agricultural field, and there are no adjacent wetlands.

Artificially constructed agricultural irrigation basins/ditches are not regulated under the Fish and Game Code (FGC) §1602.

Irrigation Basin/Ditch #4

UPSTREAM/DOWNSTREAM CONNECTIVITY – NO CONNECTIVITY

Irrigation Basin/Ditch #4 is located on the southwestern boundary of the project site. This facility travels east-west for approximately 712.2 feet covering an area of approximately 0.24 acres. This facility has numerous culvert inlets and surface flows within this facility are derived completely from the agricultural field to the north (within the project site), entering at these culverts. There is no drainage from adjacent farms or subdivisions in the area that enter this facility. Irrigation Basin/Ditch #4 does not have any downstream or upstream connectivity to "Traditional Navigable Water" (TNW).

ADJACENT WETLANDS

There are no wetlands within the project site that are adjacent to this facility. Oakwood Lakes is a manmade lake within a residential subdivision located immediately to the west. There is no hydrologic connection between the project site and the man-made Oakwood Lakes. The San Joaquin River is located approximately 7,899 feet to the west of the project site. There is no hydrologic connection between the project site and the San Joaquin River due to the construction of a federal levee system, as well as a non-federal dry levee.

JURISDICTION

Ditches fall under the Irrigation Ditch Exemption pursuant to Federal Regulations (33 CFR 323.4(a)(3)). Specifically, discharges for the construction or maintenance of farm or stock ponds or irrigation ditches have been exempted from requiring a Section 404 permit. This facility specifically does not have upstream or downstream connectivity to a TNW, it is anthropogenically created at the edge of an agricultural field, and there are no adjacent wetlands.

Artificially constructed agricultural irrigation basins/ditches are not regulated under the Fish and Game Code (FGC) §1602.

Irrigation Basin/Ditch #5

UPSTREAM/DOWNSTREAM CONNECTIVITY – NO CONNECTIVITY

Irrigation Basin/Ditch #5 is located on the southwestern boundary of the project site. This facility travels east-west for approximately 1,201.3 feet covering an area of approximately 0.28 acres. This facility has numerous culvert inlets and surface flows within this facility are derived completely from the agricultural field to the south (within the project site), entering at these culverts. There is no drainage from adjacent farms or subdivisions in the area that enter this facility. Irrigation Basin/Ditch #5 does not have any downstream or upstream connectivity to "Traditional Navigable Water" (TNW).

ADJACENT WETLANDS

There are no wetlands within the project site that are adjacent to this facility. Oakwood Lakes is a manmade lake within a residential subdivision located immediately to the west. There is no hydrologic connection between the project site and the man-made Oakwood Lakes. The San Joaquin River is located approximately 7,597 feet to the west of the project site. There is no hydrologic connection between the project site and the San Joaquin River due to the construction of a federal levee system, as well as a non-federal dry levee.

JURISDICTION

Ditches fall under the Irrigation Ditch Exemption pursuant to Federal Regulations (33 CFR 323.4(a)(3)). Specifically, discharges for the construction or maintenance of farm or stock ponds or irrigation ditches have been exempted from requiring a Section 404 permit. This facility specifically does not have upstream or downstream connectivity to a TNW, it is anthropogenically created at the edge of an agricultural field, and there are no adjacent wetlands.

Artificially constructed agricultural irrigation basins/ditches are not regulated under the Fish and Game Code (FGC) §1602.

Irrigation Basin/Ditch #6

UPSTREAM/DOWNSTREAM CONNECTIVITY – NO CONNECTIVITY

Irrigation Basin/Ditch #6 is located on the southwestern boundary of the project site. This facility travels east-west for approximately 1,863 feet covering an area of approximately 0.43 acres. This facility has numerous culvert inlets and surface flows within this facility are derived completely from the agricultural field to the south (within the project site), entering at these culverts. There is no drainage from adjacent farms or subdivisions in the area that enter this facility. Irrigation Basin/Ditch #6 does not have any downstream or upstream connectivity to "Traditional Navigable Water" (TNW).

ADJACENT WETLANDS

There are no wetlands within the project site that are adjacent to this facility. Oakwood Lakes is a manmade lake within a residential subdivision located immediately to the west. There is no

hydrologic connection between the project site and the man-made Oakwood Lakes. The San Joaquin River is located approximately 5,366 feet to the west of the project site. There is no hydrologic connection between the project site and the San Joaquin River due to the construction of a federal levee system, as well as a non-federal dry levee.

JURISDICTION

Ditches fall under the Irrigation Ditch Exemption pursuant to Federal Regulations (33 CFR 323.4(a)(3)). Specifically, discharges for the construction or maintenance of farm or stock ponds or irrigation ditches have been exempted from requiring a Section 404 permit. This facility specifically does not have upstream or downstream connectivity to a TNW, it is anthropogenically created at the edge of an agricultural field, and there are no adjacent wetlands.

Artificially constructed agricultural irrigation basins/ditches are not regulated under the Fish and Game Code (FGC) §1602.

Agricultural Field – USGS Mapped Wetlands

The USGS map shows a series of historical wetlands on the site and in the vicinity. As part of this wetland delineation, we reviewed historical aerial photos back to 1993 and it is evident that the project site has historically been cultivated and there is no historical aerial evidence of the wetlands within the past two decades. Our field work involved testing and recording soil data in three locations (within USGS wetland features) and at a control location on the project site that was approximately 1,000 feet to the northwest of the USGS wetland feature. The results of the test pits showed that there was no evidence of surface or subsurface hydrology even with over one inch of precipitation in the seven days leading up to the field work. There is no undulation or depressions that would suggest the presence of vernal pools. The site appears to have been leveled in association with the farming activities. Historical aerials support this conclusion.

Additionally, we found the soil profile to be consistent with the normal soil conditions for the Arents soil type. The soils fell in the range of 10 YR 5/3 to 6/3 and there was no evidence of hydric indicators. Additionally, we dug six other pits in and around the USGS wetland locations to simply observe the profile and to determine if we could find a soil inclusion that represented some change in the soil profile found in the test pits. We found no such evidence of a soil inclusion.

We conclude that the USGS wetland features may represent some historical wetland feature in the area; however, based on the field data and review of historical aerials for at least the last two decades there is no evidence of jurisdictional wetlands.

Agricultural Field – Hydric Soils Mapping

Ramon Aberasturi from the USACE requested a more detailed mapping of the hydric soil extent of the Guard and Dello soils on the project site. These soils lie within the agricultural field in the southwestern portion of the project site. Given the presence of hydric soils within the agricultural fields, it was requested that we fully evaluate the potential for the agricultural field to be jurisdictional.

HYDROLOGY

The region and project site generally drains from east to west and north to south. The natural drainage pattern in the area, and project site, is largely changed from its natural conditions due to agricultural activities. There are no natural drainage patterns within the Project site.

The topography of the Project site is relatively flat with an approximate six-foot elevation gain throughout the Project site (west to east). There are no natural water courses in the Project site. Two irrigation water wells are located in the western and south-central portions of the project site, with irrigation basin/ditches along the north, and south sides of the project site. The project site is farmed on a contract basis, most recently planted with alfalfa. Irrigation season runs from approximately March 15 to October 15, depending on the weather. The Project site is in the Oakwood Lake - San Joaquin River watershed, which is part of the San Joaquin River watershed.

A preliminary geotechnical report prepared by ENGEO shows that groundwater levels recorded in the borings and temporary piezometers indicate that groundwater in the southwest corner of the property ranges from 4 to 9 feet below the ground surface. Boring and piezometer were performed in other locations throughout the project site, but the shallowest groundwater was 4 to 9 feet from ground surface. Groundwater levels were recorded in April 2014 and would likely be indicative of seasonal high water.

Oakwood Lakes is a manmade lake within a residential subdivision located immediately to the west. There is no hydrologic connection between the project site and the man-made Oakwood Lakes. The San Joaquin River is located approximately 4,600 feet to the west of the project site. There is no hydrologic connection between the project site and the San Joaquin River. There is a federal levee system, as well as a non-federal dry levee that separate the agricultural field from the San Joaquin River. The agricultural field specifically does not have upstream or downstream connectivity to a TNW.

SOILS

The soils in the agricultural fields include Arents, saline-sodic, 0 to 2 percent slopes (128ac, 62.1% of site), Dello loamy sand, drained, 0 to 2 percent slopes (25.6 ac, 12.4% of site), Grangeville fine sandy loam, partially drained, 0 to 2 percent slopes (16.8 ac, 8.1% of site), Guard clay loam, drained, 0 to 2 percent slopes (21.7 ac, 10.5% of site), and Tinnin loamy coarse sand, 0-2% slopes (14.1 ac, 6.8% of site). The soil characteristics in the agricultural field contain two soils that are listed on the NRCS National Hydric Soils List. The Dello loamy sand, 0 - 2% slopes and the Guard clay loam, drained, 0 to 2 percent slopes both are listed as a high percentage hydric soil class.

We have performed field work on several different occasions. The first occasion involved testing and recording soil data in three locations that show wetland areas on historical USGS maps. This involved testing within the agricultural fields and also at a control location on the project site that was approximately 1,000 feet to the northwest of the USGS wetland feature. The results of the test pits showed that there was no evidence of surface or subsurface hydrology even with over one inch of precipitation in the seven days leading up to the field work. There is no undulation or depressions that would suggest the presence of vernal pools. The site appears to have been

leveled in association with the farming activities. Additionally, the soil profile was consistent with the normal soil conditions for the Arents soil type. The soils fell in the range of 10 YR 5/3 to 6/3 and there was no evidence of hydric indicators. Additionally, we dug six other pits in and around the USGS wetland locations to simply observe the profile and to determine if we could find a soil inclusion that represented some change in the soil profile found in the test pits. We found no such evidence of a soil inclusion. We conclude that the USGS wetland features may represent some historical wetland feature in the area; however, based on the field data and review of historical aerials for at least the last two decades there is no evidence of jurisdictional wetlands.

We also performed field work in the areas mapped as hydric on the NRCS National Hydric Soils List. In the area labeled as Guard clay loam the moist colors ranged from 10YR 4/4 with some mottles showing 3/1. The value and chroma characteristics of the mottles are largely consistent with the official description for this soil type; however, the matrix value and chroma appears to be farther from the typical for this hydric soil in the A horizon. All test pits were dug to 24 inches. A preliminary geotechnical report prepared by ENGEO shows that groundwater levels recorded in the borings and temporary piezometers indicate that groundwater in this area ranges from 4 to 9 feet below the ground surface. Groundwater levels were recorded in April 2014 and would likely be indicative of seasonal high water. The area was tilled and planted for crop. There was no buildup of organics.

In the area labeled as Dello loamy sand the moist colors ranged from 10YR 4/4 to 10YR 5/3, but there were no mottles or other redox features. The value and chroma characteristics of the matrix is largely consistent with the official description for this soil type in the A horizon. All test pits were dug to 24 inches. A preliminary geotechnical report prepared by ENGEO shows that groundwater levels recorded in the borings and temporary piezometers indicate that groundwater in this area ranges from 4 to 9 feet below the ground surface. Groundwater levels were recorded in April 2014 and would likely be indicative of seasonal high water. The area was tilled and planted for crop. There was no buildup of organics.

VEGETATION

The Project site lies within the North San Joaquin Subdivision of the California Floristic Province and lies within the Mediterranean California (LRR C) region. The agricultural field is not within a floodplain. This area has been under active agricultural use for over twenty years and was completely void of vegetation at the time of the survey.

JURISDICTION

The agricultural field lacks the presence of hydrophytic vegetation and there is no natural hydrology. The irrigation ditches fall under the Irrigation Ditch Exemption pursuant to Federal Regulations (33 CFR 323.4(a)(3)). There is no hydrologic connection between the project site and closest TNW. There is a federal levee system, as well as a non-federal dry levee, that presents the project site from being in the flood plain. This agricultural field specifically does not have upstream or downstream connectivity to a TNW. The agricultural field is not a wetland and is not subject to jurisdiction by regulatory agencies.



Legend

Ordinary High Water Mark

Project Boundary

Sources: ArcGIS Online Imagery Map Service. Map date: May 17, 2016

N

0 25 50

Feet

1 inch = 100 feet

1:1,200

OAKWOOD TRAILS EIR

Figure 7a: Hydrologic Features
Cross Section ID 1

OHWM Approx. 5'

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Legend

Ordinary High Water Mark

Project Boundary

N

0 25 50

Feet

1 inch = 100 feet

1:1,200

Sources: ArcGIS Online Imagery Map Service. Map date: May 17, 2016

OAKWOOD TRAILS EIR

Figure 7b: Hydrologic Features
Cross Section ID 2

OHWM approx 18'

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Legend

- Ordinary High Water Mark
- Project Boundary

N

0 25 50

Feet

1 inch = 100 feet

1:1,200

Sources: ArcGIS Online Imagery Map Service. Map date: May 17, 2016.

OAKWOOD TRAILS EIR

Figure 7c: Hydrologic Features
Cross Section ID 3

OHWM approx 15'

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OAKWOOD TRAILS EIR

Figure 7d: Hydrologic Features
Cross Section ID 4

OHWM approx 15'

Legend

- Ordinary High Water Mark
- Project Boundary

N

0 25 50

Feet

1 inch = 100 feet

1:1,200

Source: ArcGIS Online Imagery Map Service. Map date: May 17, 2016.

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Legend

- Ordinary High Water Mark
- Project Boundary

N

0 50 100

Feet

1 inch = 150 feet

1:1,800

Sources: ArcGIS Online Imagery Map Service. Map date: May 17, 2016

OAKWOOD TRAILS EIR

Figure 7e: Hydrologic Features
Cross Section ID 5

OHWM approx 10'

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Legend

- Ordinary High Water Mark
- Project Boundary

Sources: ArcGIS Online Imagery Map Service. Map date: May 17, 2016

N

0 50 100

Feet

1 inch = 200 feet

1:2,400

OAKWOOD TRAILS EIR

Figure 7f: Hydrologic Features
Cross Section ID 6

OHWM approx 10'

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APPENDIX A: SITE PHOTOGRAPHS

Hydro Feature ID 1





Hydro Feature ID 2





Hydro Feature ID 3



Hydro Feature ID 4



Hydro Feature ID 5





Hydro Feature ID 6



APPENDIX B: WETLAND DATA FORMS

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Manteca Oakwood Trails Project City/County: Manteca/San Joaquin Sampling Date: 4/14/16

Applicant/Owner: City of Manteca State: CA Sampling Point: 1

Investigator(s): Steve McMurtry Section, Township, Range: Land Grant area

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): none Slope (%): <1%

Subregion (LRR): LRRC Lat: Long: Datum: WGS 84

Soil Map Unit Name: Guard clay loam, drained, 0 to 2 percent slopes NWI classification: Agricultural

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation X, Soil X, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No X

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

Agricultural field, no USGS mapped wetland area, no aerial evidence of wetlands. Mapped hydric soils.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

Agricultural field, tilled w/ rows, no vegetation. Aerials show farming since at least two decades. Bare ground.

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/4	95	10YR 3/1	5	RM	M	LS	Loamy Sand

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

Guard clay loam, drained, 0 to 2 percent slopes is mapped hydric. Soil tests show sandy redox characteristics.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Precipitation immediately before the April field survey.

Remarks:

No evidence of surface or subsurface hydrology. Geotechnical borings show groundwater is 4-9 feet throughout the site.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Manteca Oakwood Trails Project City/County: Manteca/San Joaquin Sampling Date: 4/14/16

Applicant/Owner: City of Manteca State: CA Sampling Point: 2

Investigator(s): Steve McMurtry Section, Township, Range: Land Grant area

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): none Slope (%): <1%

Subregion (LRR): LRRC Lat: Long: Datum: WGS 84

Soil Map Unit Name: Guard clay loam, drained, 0 to 2 percent slopes NWI classification: Agricultural

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation X, Soil X, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No X

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

Agricultural field, no USGS mapped wetland area, no aerial evidence of wetlands. Mapped hydric soils.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

Agricultural field, tilled w/ rows, no vegetation. Aerials show farming since at least two decades. Bare ground.

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/4	95	10YR 3/1	5	RM	M	LS	Loamy Sand

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

Guard clay loam, drained, 0 to 2 percent slopes is mapped hydric. Soil tests show sandy redox characteristics.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Precipitation immediately before the April field survey.

Remarks:

No evidence of surface or subsurface hydrology. Geotechnical borings show groundwater is 4-9 feet throughout the site.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Manteca Oakwood Trails Project City/County: Manteca/San Joaquin Sampling Date: 4/14/16

Applicant/Owner: City of Manteca State: CA Sampling Point: 3

Investigator(s): Steve McMurtry Section, Township, Range: Land Grant area

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): none Slope (%): <1%

Subregion (LRR): LRRC Lat: Long: Datum: WGS 84

Soil Map Unit Name: Guard clay loam, drained, 0 to 2 percent slopes NWI classification: Agricultural

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation X, Soil X, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No X

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

Agricultural field, no USGS mapped wetland area, no aerial evidence of wetlands. Mapped hydric soils.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

Agricultural field, tilled w/ rows, no vegetation. Aerials show farming since at least two decades. Bare ground.

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/4	95	10YR 3/1	5	RM	M	LS	Loamy Sand

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

Guard clay loam, drained, 0 to 2 percent slopes is mapped hydric. Soil tests show sandy redox characteristics.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Precipitation immediately before the April field survey.

Remarks:

No evidence of surface or subsurface hydrology. Geotechnical borings show groundwater is 4-9 feet throughout the site.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Manteca Oakwood Trails Project City/County: Manteca/San Joaquin Sampling Date: 4/14/16

Applicant/Owner: City of Manteca State: CA Sampling Point: 4

Investigator(s): Steve McMurtry Section, Township, Range: Land Grant area

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): none Slope (%): <1%

Subregion (LRR): LRRC Lat: Long: Datum: WGS 84

Soil Map Unit Name: Guard clay loam, drained, 0 to 2 percent slopes NWI classification: Agricultural

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation X, Soil X, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No X

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

Agricultural field, no USGS mapped wetland area, no aerial evidence of wetlands. Mapped hydric soils.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

Agricultural field, tilled w/ rows, no vegetation. Aerials show farming since at least two decades. Bare ground.

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/4	95	10YR 3/1	5	RM	M	LS	Loamy Sand

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ____

Remarks:

Guard clay loam, drained, 0 to 2 percent slopes is mapped hydric. Soil tests show sandy redox characteristics.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Precipitation immediately before the April field survey.

Remarks:

No evidence of surface or subsurface hydrology. Geotechnical borings show groundwater is 4-9 feet throughout the site.



OAKWOOD TRAILS EIR

Exhibit E: Hydric Soils Map

Legend

- Soil Data Points
- Hydric Soils

N

0 200 400

Feet

18,000

Sources: San Joaquin County GIS; ArcGIS Online Imagery Map Service.
Map date: May 10, 2016.

De Novo Planning Group

APPENDIX C: OHWM FORMS

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Oakwood Trails
Project Number:
Stream: Agricultural Irrigation Basin
Investigator(s): Steve McMurtry

Date: 4/14 **Time:** 11:55am
Town: Manteca **State:** Ca
Photo begin file#: **Photo end file#:**

Y ☐ / N ☑ Do normal circumstances exist on the site?

Y ☐ / N ☑ Is the site significantly disturbed?

Location Details:
Southwest end of field

Projection: Lat/Long (GRS80) **Datum:** NAD 1983
Coordinates:

Potential anthropogenic influences on the channel system:

The detention basin is anthropologically created for detention of agricultural irrigation runoff.

Brief site description:

The detention basin serve as irrigation drainage for the agricultural field located to the north. No surface water in basin immediately following rain event.

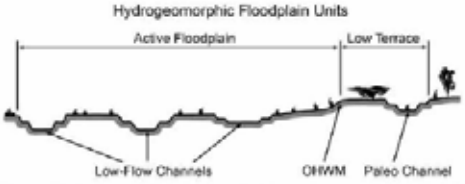
Checklist of resources (if available):

- ☑ Aerial photography
  Dates:
- ☑ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☑ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☐ Global positioning system (GPS)
- ☐ Other studies

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Wentworth Size Classes

Millimeters (mm)	Inches (in)	Wentworth size class	
10.08	256	Boulder	
2.56	64	Cobble	Gravel
0.157	4	Pebble	
0.079	2.00	Granule	
0.039	1.00	Very coarse sand	
0.020	0.50	Coarse sand	
1/2 0.0098	0.25	Medium sand	Sand
1/4 0.005	0.125	Fine sand	
1/8 0.0025	0.0625	Very fine sand	
1/16 0.0012	0.031	Coarse silt	
1/32 0.00061	0.0156	Medium silt	Silt
1/64 0.00031	0.0078	Fine silt	
1/128 0.00015	0.0039	Very fine silt	
		Clay	Mud



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☐ GPS
   - ☐ Digitized on computer
   - ☐ Other:

Project ID: Oakwood Trails **Cross section ID:** 1 **Date:** 4/14 **Time:** 11:55am

Cross section drawing:

OHWM

GPS point: 1

Indicators:

- ☐ Change in average sediment texture
- ☐ Change in vegetation species
- ☐ Change in vegetation cover
- ☑ Break in bank slope
- ☑ Other: water marks
- ☐ Other: _____

Comments:

The OHWM is evident from water marks on the bank at the southern end of the basin. This is the lowest point in the basin.

Floodplain unit:

☐ Low-Flow Channel ☐ Active Floodplain ☑ Low Terrace

GPS point: 1

Characteristics of the floodplain unit:

Average sediment texture: loamy coarse sand

Total veg cover: 5% % Tree: 0% % Shrub: 0% % Herb: 5% %

Community successional stage:

- ☑ NA
- ☑ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☑ Other: Water marks
- ☐ Other: _____
- ☐ Other: _____

Comments:

The basin is earthen bottom and serves irrigation drainage function for the ag field. No outlet. Inlet is approx. 24 inch culvert located on south end of basin. Culvert is half filled w/ sediment. Woodward Ave. is S. of basin and ag road is N. of basin. Limited vegetation, probably as a result of weed abatement measures, but also from lack of water. Veg consisted of geranium, brassica, pimpernel, vetch.

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Oakwood Trails
Project Number:
Stream: Agricultural Irrigation Basin
Investigator(s): Steve McMurtry

Date: 4/14
Town: Manteca
Photo begin file#:

Time: 11:55am
State: Ca
Photo end file#:

Y ☐ / N ☑ Do normal circumstances exist on the site?

Y ☐ / N ☑ Is the site significantly disturbed?

Location Details:
Southwest end of field

Projection: Lat/Long (GRS80) **Datum:** NAD 1983
Coordinates:

Potential anthropogenic influences on the channel system:

The detention basin is anthropologically created for detention of agricultural irrigation runoff.

Brief site description:

The detention basin serve as irrigation drainage for the agricultural field located to the north. Some surface water in basin immediately following rain event. Drainage is through perforated pipe underground in ag field.

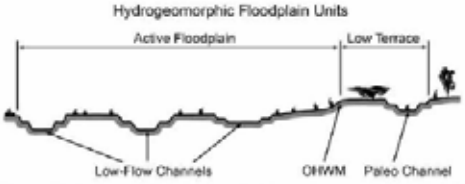
Checklist of resources (if available):

- ☑ Aerial photography
  Dates:
- ☑ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☑ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☐ Global positioning system (GPS)
- ☐ Other studies

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Wentworth Size Classes

Millimeters (mm)	Inches (in)	Wentworth size class	
10.08	256	Boulder	
2.56	64	Cobble	Gravel
0.157	4	Pebble	
0.079	2.00	Granule	
0.039	1.00	Very coarse sand	
0.020	0.50	Coarse sand	
1/2 0.0098	0.25	Medium sand	Sand
1/4 0.005	0.125	Fine sand	
1/8 0.0025	0.0625	Very fine sand	
1/16 0.0012	0.031	Coarse silt	
1/32 0.00061	0.0156	Medium silt	Silt
1/64 0.00031	0.0078	Fine silt	
1/128 0.00015	0.0039	Very fine silt	
		Clay	Mud



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   ☐ Mapping on aerial photograph ☐ GPS
   ☐ Digitized on computer ☐ Other:

Project ID: Oakwood Trails **Cross section ID:** 2 **Date:** 4/14 **Time:** 11:55am

Cross section drawing:

OHWM

GPS point: 2

Indicators:

- ☐ Change in average sediment texture
- ☐ Change in vegetation species
- ☐ Change in vegetation cover
- ☑ Break in bank slope
- ☑ Other: water marks
- ☑ Other: Water

Comments:

The OHWM is evident from water marks on the bank.

Floodplain unit:

☐ Low-Flow Channel ☐ Active Floodplain ☑ Low Terrace

GPS point: 2

Characteristics of the floodplain unit:

Average sediment texture: loamy coarse sand

Total veg cover: 5% % Tree: 0% % Shrub: 0% % Herb: 5% %

Community successional stage:

- ☑ NA
- ☑ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☑ Other: Water marks
- ☑ Other: Water
- ☐ Other:

Comments:

The basin is earthen bottom and serves irrigation drainage function for the ag field. No outlet. Inlet includes perforated pipes located on the north bank that extend into the ag field. Woodward Ave. is S. of basin and ag road is N. of basin. Limited vegetation, probably as a result of weed abatement measures. Veg consisted of geranium, brassica, pimpernel, vetch.

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Oakwood Trails
Project Number:
Stream: Agricultural Irrigation Basin
Investigator(s): Steve McMurtry

Date: 4/14
Town: Manteca
Photo begin file#:

Time: 11:55am
State: Ca
Photo end file#:

Y ☐ / N ☑ Do normal circumstances exist on the site?

Y ☐ / N ☑ Is the site significantly disturbed?

Location Details:
Southwest end of field

Projection: Lat/Long (GRS80) **Datum:** NAD 1983
Coordinates:

Potential anthropogenic influences on the channel system:

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Brief site description:

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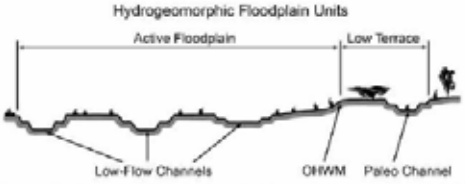
Checklist of resources (if available):

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- ☐ Vegetation maps
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- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☐ Global positioning system (GPS)
- ☐ Other studies

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Wentworth Size Classes

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1/4 0.005	0.125	Fine sand	
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1/32 0.00061	0.0156	Medium silt	Silt
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1/128 0.00015	0.0039	Very fine silt	
		Clay	Mud



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

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4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   ☐ Mapping on aerial photograph ☐ GPS
   ☐ Digitized on computer ☐ Other:

Project ID: Oakwood Trails **Cross section ID:** 3 **Date:** 4/14 **Time:** 11:55am

Cross section drawing:

OHWM

GPS point: 3

Indicators:

- ☐ Change in average sediment texture
- ☐ Change in vegetation species
- ☐ Change in vegetation cover
- ☑ Break in bank slope
- ☑ Other: water marks
- ☑ Other: water

Comments:

The OHWM is evident from water marks on the bank.

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☑ Low Terrace

GPS point: 3

Characteristics of the floodplain unit:

Average sediment texture: loamy coarse sand

Total veg cover: 5% % Tree: 0% % Shrub: 0% % Herb: 5% %

Community successional stage:

- ☑ NA
- ☑ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☑ Other: Water marks
- ☑ Other: Water
- ☐ Other:

Comments:

The basin is earthen bottom and serves irrigation drainage function for the ag field. No outlet. Inlet includes perforated pipes located on the north bank that extend into the ag field. Woodward Ave. is S. of basin and ag road is N. of basin. Limited vegetation, probably as a result of weed abatement measures. Veg consisted of geranium, brassica, pimpernel, vetch.

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Oakwood Trails
Project Number:
Stream: Agricultural Irrigation Basin
Investigator(s): Steve McMurtry

Date: 4/14
Town: Manteca
Photo begin file#:

Time: 11:55am
State: Ca
Photo end file#:

Y ☐ / N ☑ Do normal circumstances exist on the site?

Y ☐ / N ☑ Is the site significantly disturbed?

Location Details:
Southwest end of field

Projection: Lat/Long (GRS80) **Datum:** NAD 1983
Coordinates:

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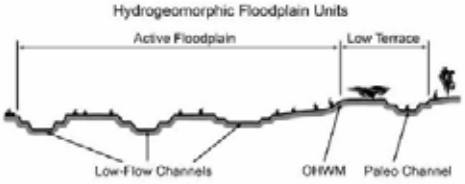
Checklist of resources (if available):

- ☑ Aerial photography
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- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☐ Global positioning system (GPS)
- ☐ Other studies

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
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1/64 0.00031	0.0078	Fine silt	
1/128 0.00015	0.0039	Very fine silt	
		Clay	Mud



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
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3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   ☐ Mapping on aerial photograph ☐ GPS
   ☐ Digitized on computer ☐ Other:

Project ID: Oakwood Trails **Cross section ID:** 4 **Date:** 4/14 **Time:** 11:55am

Cross section drawing:

OHWM

GPS point: 4

Indicators:

- ☐ Change in average sediment texture
- ☐ Change in vegetation species
- ☐ Change in vegetation cover
- ☑ Break in bank slope
- ☑ Other: water marks
- ☑ Other: water

Comments:

The OHWM is evident from water marks on the bank.

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☑ Low Terrace

GPS point: 4

Characteristics of the floodplain unit:

Average sediment texture: loamy coarse sand

Total veg cover: 5% % Tree: 0% % Shrub: 0% % Herb: 5% %

Community successional stage:

- ☑ NA
- ☑ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

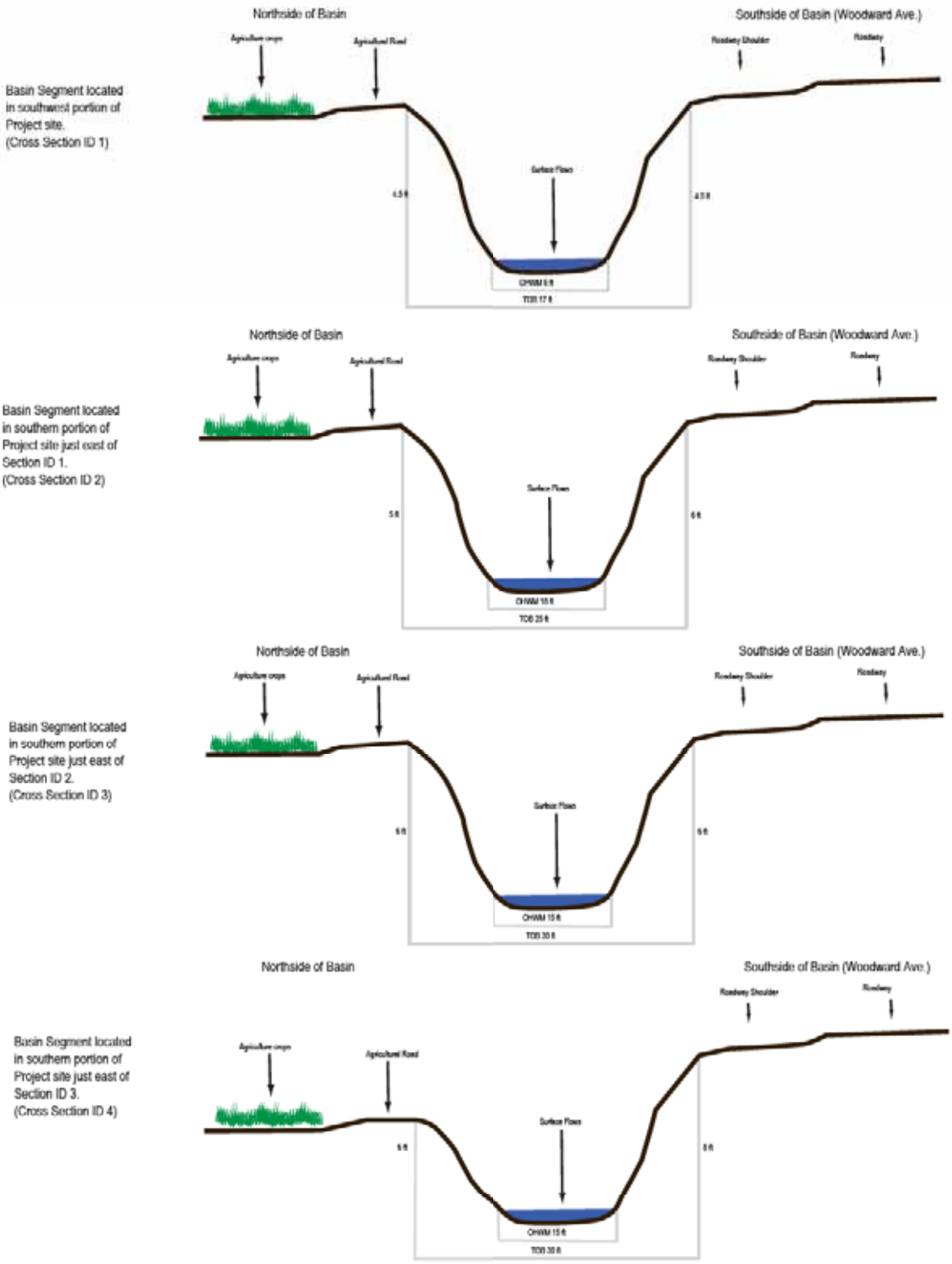
Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☑ Other: Water marks
- ☑ Other: Water
- ☐ Other:

Comments:

The basin is earthen bottom and serves irrigation drainage function for the ag field. No outlet. Inlet includes perforated pipes located on the north bank that extend into the ag field. Woodward Ave. is S. of basin and ag road is N. of basin. Limited vegetation, probably as a result of weed abatement measures. Veg consisted of geranium, brassica, pimpernel, vetch.

APPENDIX D: CROSS SECTIONS

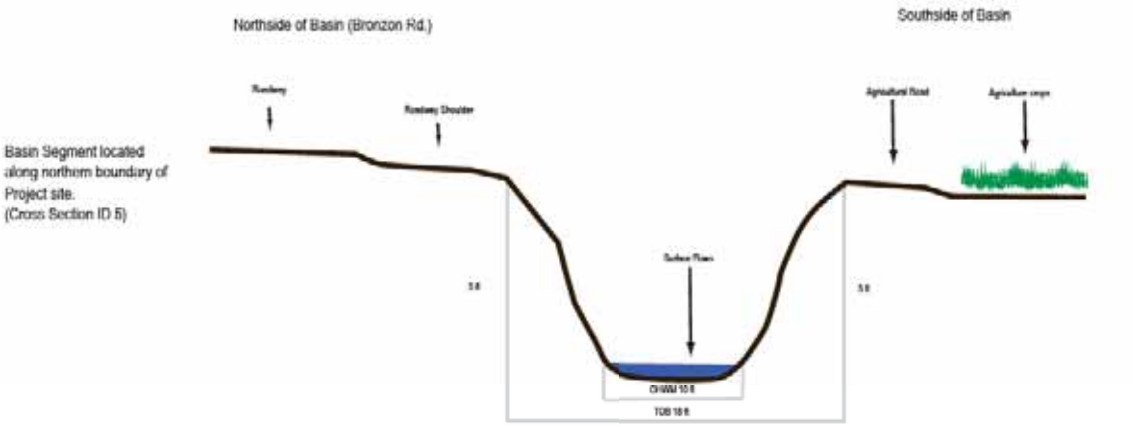


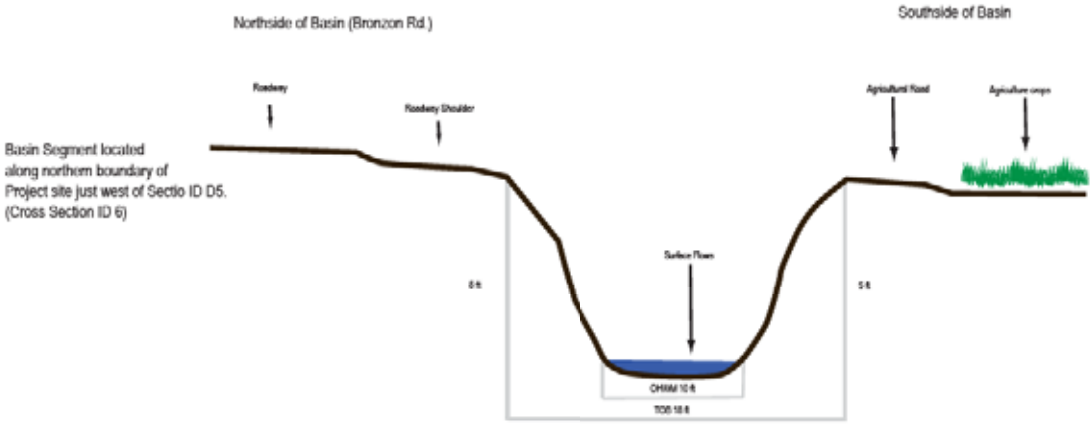
OHWM - Ordinary High Water Mark

TOB - Top of Bank

Data Source: Field Data, 2016

Not To Scale





OHWM - Ordinary High Water Mark

TOB - Top of Bank

Data Source: Field Data, 2016

Not To Scale