Hayward Mission Family Apartments Project

Environmental Consistency Checklist Pursuant to CEQA Guidelines Section 15183

prepared by

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Initial Study

1. Project Title

Hayward Mission Family Apartments Project

2. Lead Agency Name and Address

City of Hayward
777 B Street, 1st Floor
Hayward, California 94541

3. Contact Person and Phone Number

Marcus Martinez, Associate Planner
City of Hayward, Development Services Department
(510) 583-4236 marcus.martinez@hayward-ca.gov

4. Project Location

The project site is a vacant 2.21-acre infill site located at 29497, 29547, and 29553 Mission Boulevard, Assessor Parcel Nos. 078C-0438-013-06, 078C-0438-014-00, and 078C-0438-015-02, respectively, approximately 0.5-miles from the South Hayward BART station. The project site is situated on the west side of the street, approximately 300-feet northwest of the Mission Boulevard and Industrial Parkway intersection. Surrounding development and land uses include the International Laborers Union Hall and future SoHay development to the north, a residential apartment complex to the west along the rear of the project site, a commercial shopping center to the south, and miscellaneous commercial and automobile service shops across the street to the east. Figure 1 shows the location of the site in the region, Figure 2 depicts the project site in its neighborhood context, and Figure 3 depicts the site and its proximity to the South Hayward Bay Area Rapid Transit (BART) system.

5. Project Applicant

Meta Housing Corporation
11150 West Olympic Boulevard, Suite 620
Los Angeles, California 90064

6. General Plan Designation

The project site is designated Sustainable Mixed Use (SMU) in the Hayward 2040 General Plan which allows for a density range of 35 to 55 dwelling units per net acre (City of Hayward 2014a).

Figure 1 Regional Location

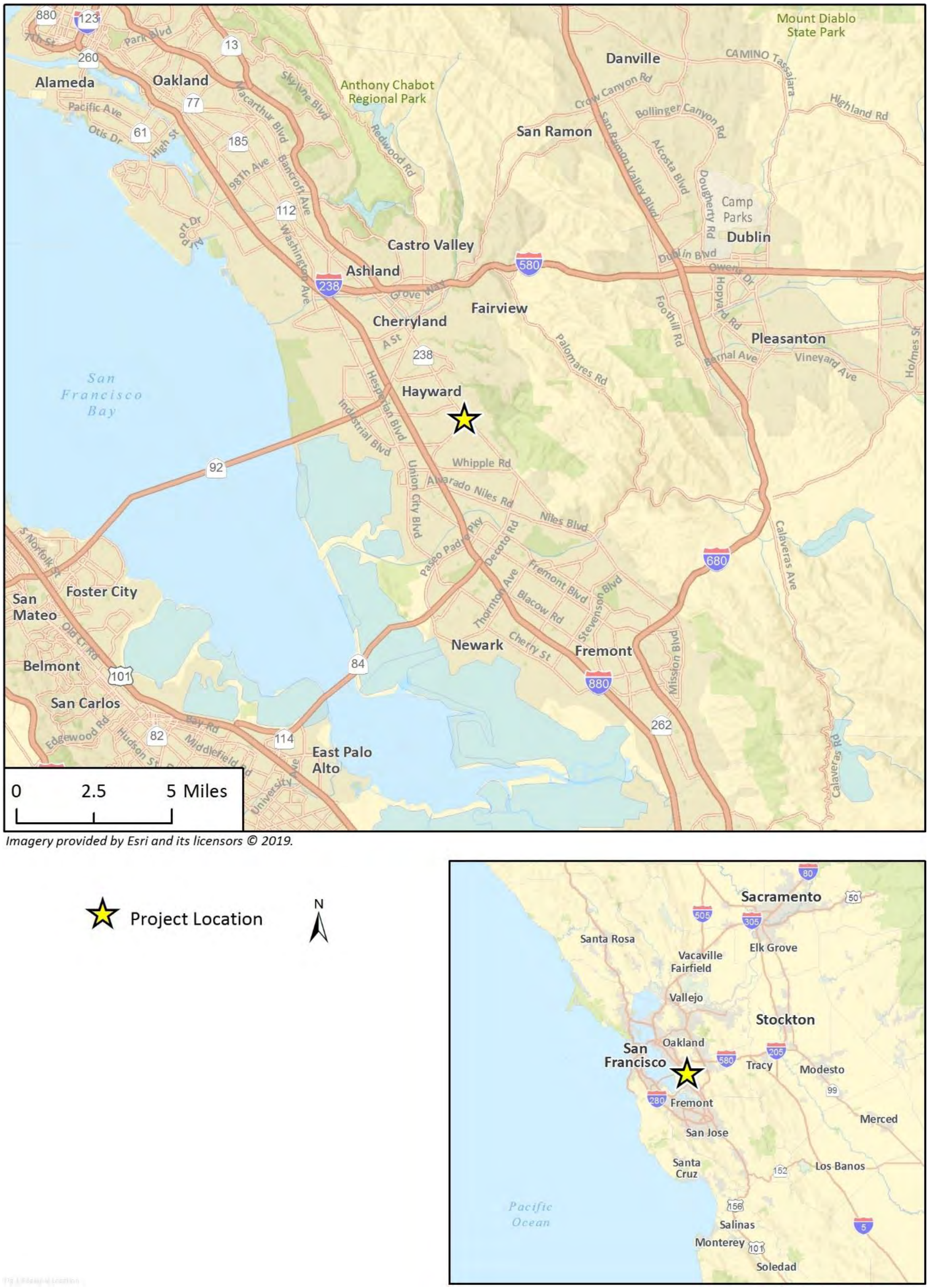

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Figure 2 Project Site Location

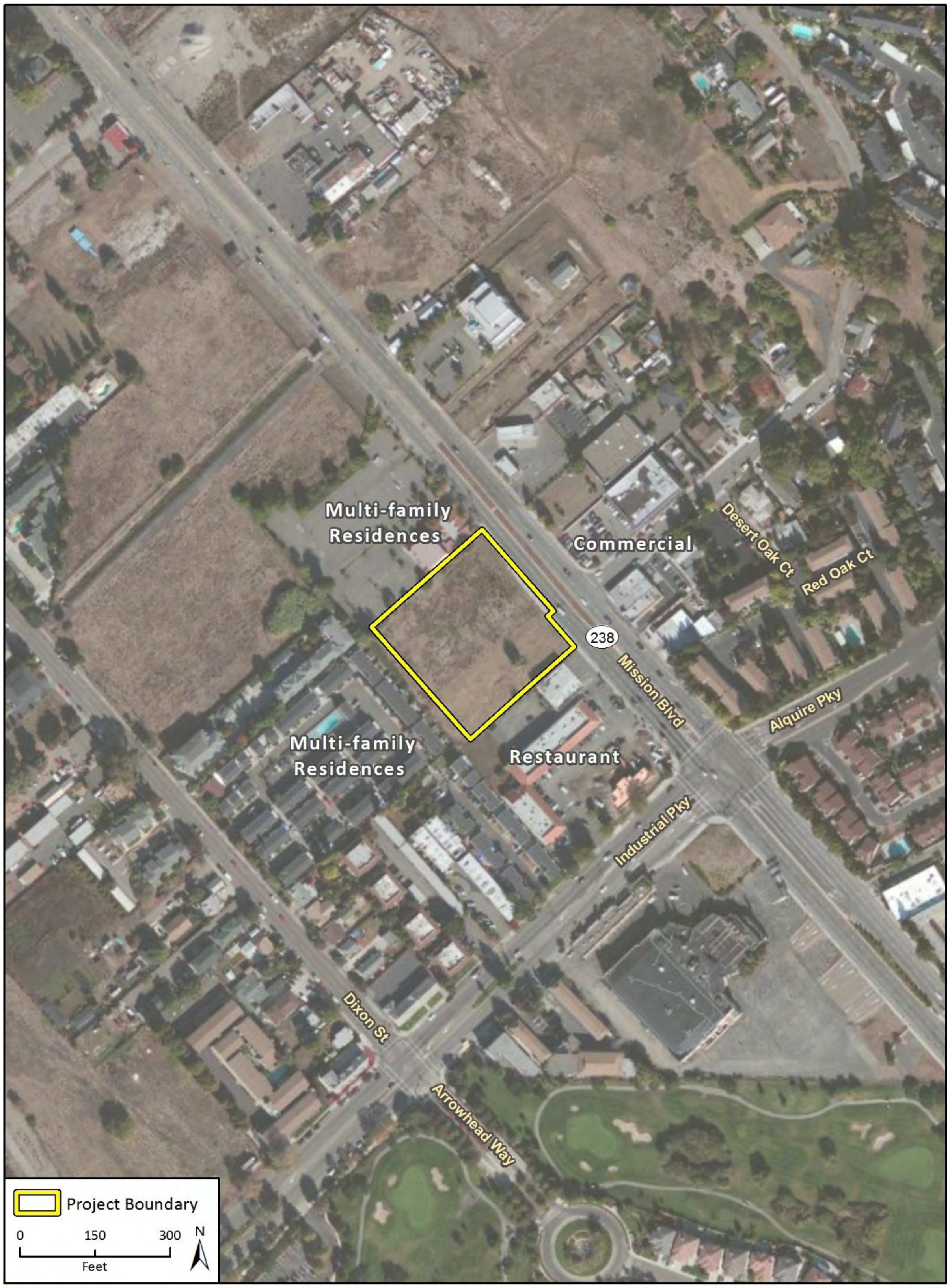

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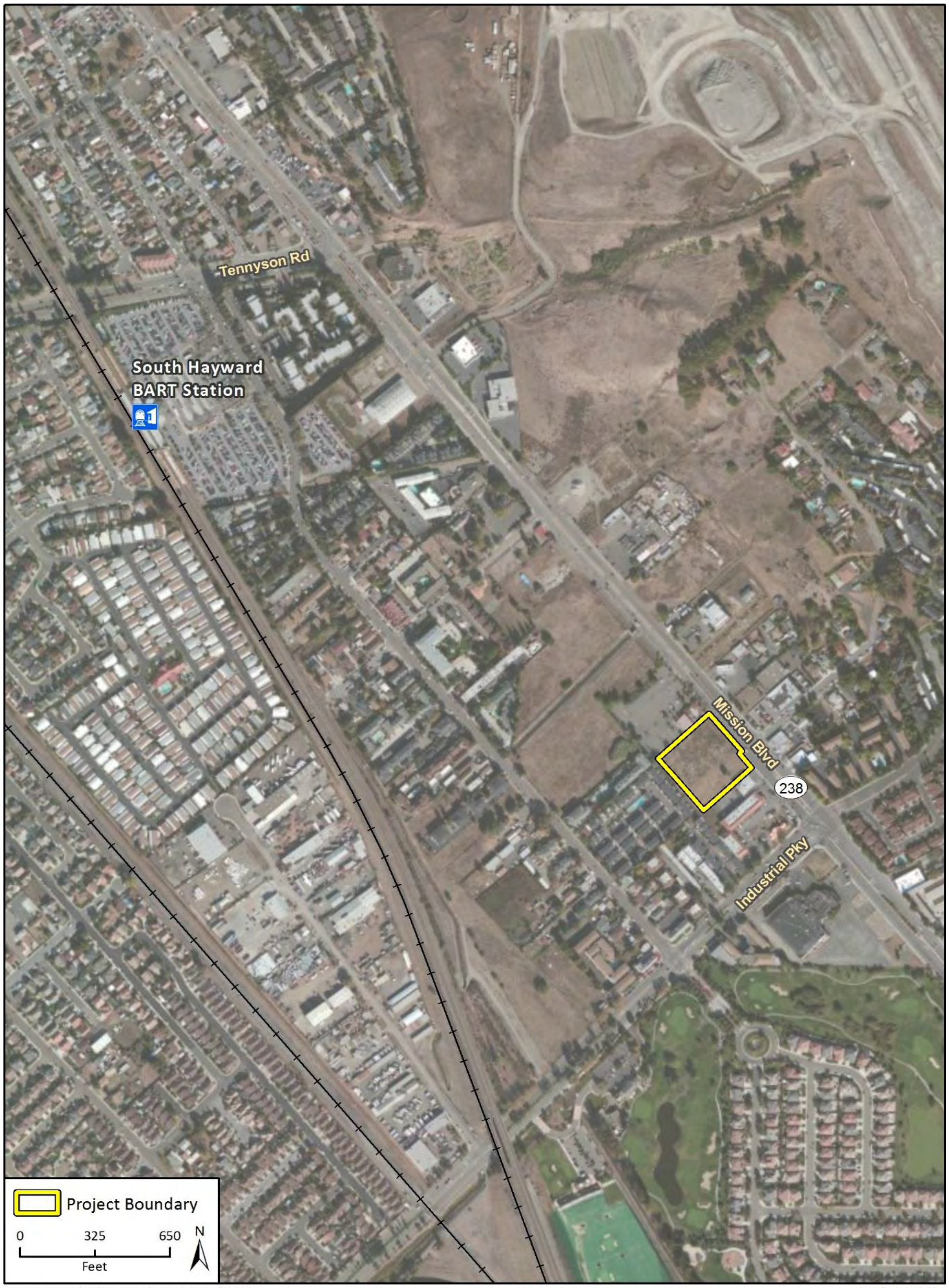
Fig 2 Project Location

Figure 3 Project Vicinity



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7. Zoning

The project site is located within the Urban Center Zone (S-T5) of the South Hayward BART/Mission Boulevard Form Based Code area codified as Chapter 10, Article 24 of the Hayward Municipal Code. The South Hayward BART/Mission Boulevard Form Based Code is intended to promote Transit Oriented Development (TODs) that is compact, pedestrian oriented, and mixed-use in form concentrated in proximity to the South Hayward BART station to provide “meaningful choices in living arrangements as manifested by distinct physical environments” (Section 10-24.115 of the Hayward Municipal Code).

The general character of the S-T5 zone is envisioned to consist of higher density mixed-use buildings that accommodate retail, office, and residential uses, along with townhouses and apartment buildings. The zone is intended to have a tight network of streets, with wide sidewalks, steady street tree planting and buildings set close to the sidewalks.

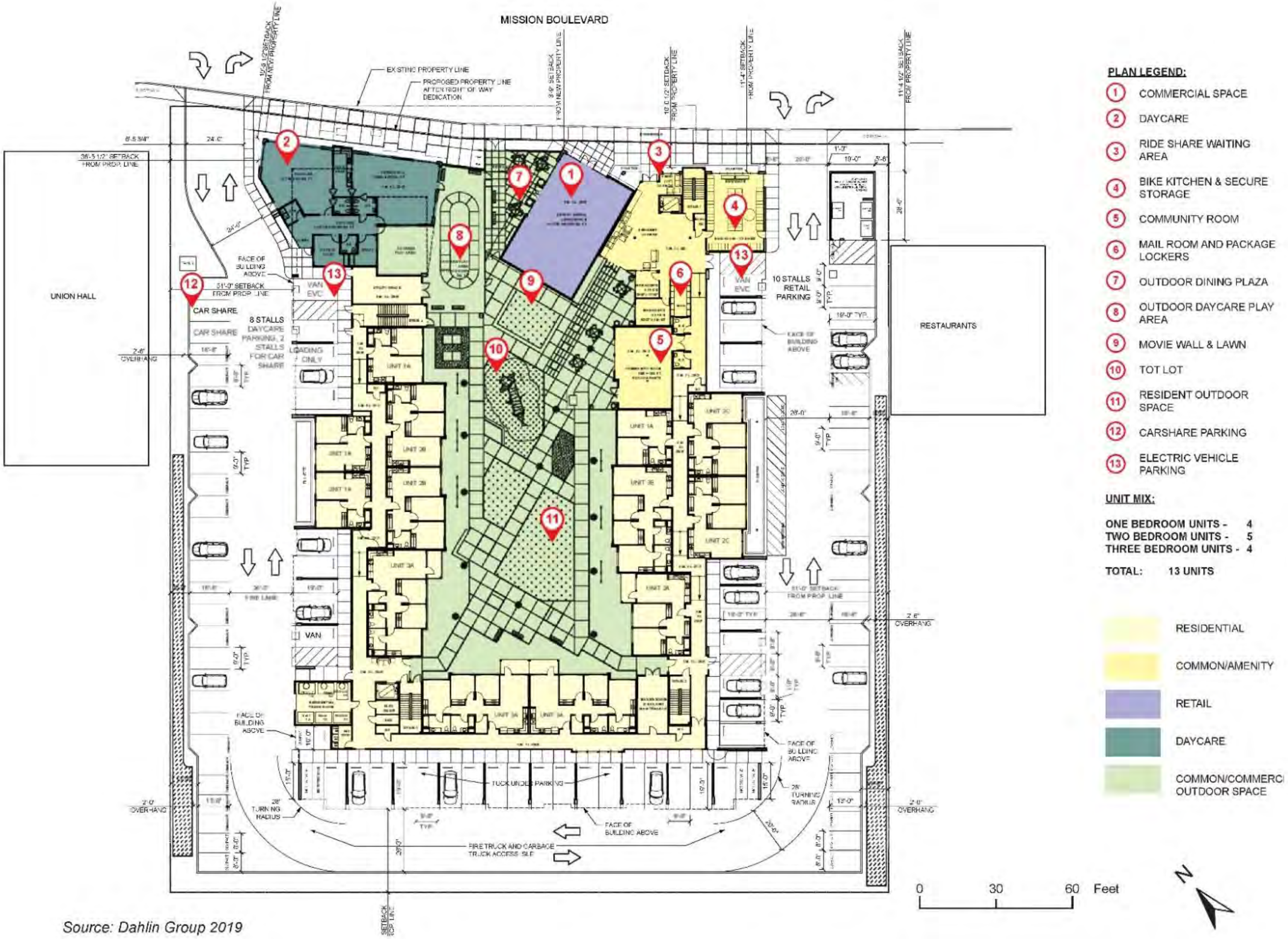
8. Description of Project

The proposed project would involve the construction of a five-story, mixed-use transit-oriented development with 140 affordable rental units for families on a currently undeveloped infill site, which is approximately 75 percent surrounded by development. The apartment complex would consist of 43 one-bedroom units, 55 two-bedroom units (including one two-bedroom manager’s unit), and 42 three-bedroom units. As shown in the project site plans in Figure 4 through Figure 9, the proposed building would be constructed in a U-shaped pattern with a landscaped courtyard area in the center of the complex. The proposed project would include an approximately 2,700 square foot day care center with an 1,800 square foot secured exterior play area that would be located at the northern corner of the project site along Mission Boulevard. Additionally, approximately 1,800 square-feet of commercial space would be in an attached building at the northern frontage of the project site along Mission Boulevard. See Table 1 for a summary of project characteristics.

Along with common areas and open space courtyards available to the residents, the proposed project would also include flexible community space suited to be adaptable to community needs. The proposed project would also include a resident lounge, a secured bike room with space for 73 bikes, a bike repair station, and an approximately 670 square foot community roof deck that would overlook Mission Boulevard. The rooftop would also include solar photovoltaic panels.

The project applicant has requested to use two density bonus concessions/incentives, consistent with State Density Bonus Law. One bonus would apply to a deviation from the building disposition (setback) requirements, and the other would be for the removal of the required new thoroughfare with a 56-foot right-of-way street that runs along the rear of the project site. This thoroughfare requirement is outlined in the *South Hayward BART/Mission Boulevard Form-Based Code.*

Figure 4 Proposed First Floor Plan



Source: Dahlin Group 2019

Figure 5 Proposed Second Floor Plan

Source: Dahlin Group 2019

Figure 6 Proposed Third Floor Plan

UNIT MIX:

ONE BEDROOM UNITS -	10
TWO BEDROOM UNITS -	12
THREE BEDROOM UNITS -	10
TOTAL:	32 UNITS

Source: Dahlin Group 2019

Figure 7 Proposed Fourth Floor Plan

Source: Dahlin Group 2019

Figure 8 Proposed Fifth Floor Plan

Source: Dahlin Group 2019

Figure 9 Proposed Roof Plan

Source: Dahlin Group 2019

Attachment V

Table 1 Project Summary

Site Area	
Site Total	96,268 square feet (2.21 acres)
Gross Building Area Totals (square feet)	
Residential	113,586 (140 units)
Common/Amenity Space	6,781
Private Open Space	2,435
Circulation	27,287
Utility	4,336
Commercial (Daycare & Retail)	4,503
Covered Walkways & Parking	11,214
Parking Stalls	
Residential Compact Stalls	54
Residential Standard Stalls	23
Retail Compact Stalls	2
Retail Standard Stalls	8
Daycare Compact Stalls	2
Daycare Standard Stalls	6
Carshare Standard Stalls	2
Motorcycle Standard Stalls	4
Total	**101**
Bicycle Parking (stalls)	
Short-term	16
Long-term	73
Total	**89**
Open Space (square feet)	
Common- Interior Courtyard	12,532
Common- Retail Courtyard	880
Common- Community Roof Deck	668
Subtotal	**14,080**
Private- Daycare Play Area	1,791
Private- Resident Balconies	2,435
Subtotal	**4,226**
Total	**18,306**

Site Access, Circulation, and Parking

Pursuant to the South Hayward BART Form Based Code (FBC), there is no minimum parking requirement for residential uses. The FBC establishes a maximum cap of 1.5 parking spaces per rental unit requires minimum bicycle parking for short- and long-term use. The project will include a total of 101 parking spaces, including 58 compact spaces, two car share spaces, two electric vehicle spaces, and four motorcycle spaces. Surface parking will be located around the perimeter of the principal building and the remainder will be located as tuck-under spaces along all three building sides, excluding Mission Boulevard. The project will also include capacity for 73 long-term bicycle parking spaces and 16 short-term bicycle parking spaces along the street frontage focused adjacent to the commercial tenant space.

Access to the project site will be provided from Mission Boulevard with two, separate driveway approaches that will each be able to accommodate two-way traffic. The 26-foot wide drive aisle will be designed to accommodate Fire Department vehicle access, trash service, and the residents. Loading and unloading areas for commercial and residential vehicles will be conducted on private property and will take place within the parking lot area adjacent to the side entrance of the principal structure. Pedestrian circulation to the site will similarly come from Mission Boulevard; however, the residents, patrons, and/or visitors will enter via the designated lobby entrances or through the courtyard entrance between the daycare and commercial space.

Grading and Drainage

Grading and excavation associated with the proposed project would be limited to trenching for new utility lines and building foundations. Construction activities would require approximately 2,500 cubic yards of imported fill material.

Based on applicant provided information, existing impervious surfaces on the project site total approximately 2,047 square feet (approximately two percent of site area) and include existing sidewalks and driveways around the perimeter of the project site. The proposed project would increase on-site impervious surfaces by 78,396 square feet for a total on-site impervious surface area of 80,746 square-feet. Stormwater would be collected and transported through new storm drains throughout the project site that would connect to the existing City of Hayward municipal storm drain system. Additionally, five stormwater bioretention areas ranging from 314 square feet to 1,086 square feet in size would be placed throughout the site to capture and treat runoff.

Landscaping and Trees

According to an Arborist report prepared by certified arborist Katie J. Krebs for the project site on March 14, 2019 (included in Appendix A along with a report addendum dated August 30, 2019), there are nine existing trees on the project site (two evergreen ash trees, two olive trees, three fan palms, one Canary island date palm, and one *Prunus* species), and nine off-site trees bordering the site but located on adjacent properties. Of the 18 trees surveyed, eight different species were represented. All nine on-site trees, which are deemed protected trees according to Chapter 10, Article 15 of the Hayward Municipal Ordinance, (Tree Preservation Ordinance), would be removed with construction of the proposed project (Appendix A).

With implementation of the proposed project, a total of 65 new trees would be planted throughout the proposed project including the courtyard in the center of the project site, street trees along Mission Boulevard, and along the perimeter of the project site and parking lot area. Ornamental trees would include species such as October glory maple (*Acer rubrum*), forest pansy redbud (*Cercis* *canadensis*), Australian willow (*Geijera parviflora*), sawleaf selkova (*Selkova serrata*), Chinese elm (*Ulmus parvifolia*) and other draught tolerant trees.

Figure 10 shows the location of proposed trees and shrubs at the project site. The project would involve other new landscaping elements, including shrubs and ground cover along the building perimeters and property lines, and a landscaped central courtyard that will comply with Chapter 10, Article 12 of the Hayward Municipal Code (Bay Friendly Water Efficient Landscape Ordinance). The total square footage of landscaped area would be 13,526 square feet.

Open Space and Amenities

The proposed project would provide private and common open space areas including a central landscaped courtyard with a lawn and outdoor barbequing and dining area (refer to Table 1 for a breakdown of open space provided). Additional residential outdoor space would be provided on the 2nd floor roof deck that would include seating and shaded areas overlooking Mission Boulevard. The proposed project would also include community amenities including a tot lot playground, raised community planters, movie wall and lawn, and a common outdoor patio area near the commercial tenant space along Mission Boulevard for dining and/or lounging

Off-Site Improvements

The project would include sidewalk improvements and pavement replacement along road frontages on the project site borders, including new curbs, ramps, and pedestrian lighting compliant with City of Hayward standards.

9. Surrounding Land Uses and Setting

The project site is generally flat and currently vacant. There are some existing paved sidewalks at the perimeter; however, the majority of the site consists of ruderal vegetation. Figure 2 shows the project site bordered by Mission Boulevard along its northeastern frontage, with a commercial shopping center to the south, a residential apartment complex to the west, and the International Laborers Union Hall and future SoHay development to the north.

The project vicinity is characterized primarily uses compatible with mixed-use development similar to the proposed project and commercial uses. The area immediately surrounding the project site is zoned T5: Urban Center Zone.

Figure 10 Proposed Landscape Plan

Source: Gates + Associates 2019

10. Project Approvals

The City of Hayward is the lead agency with responsibility for approving the project. Discretionary approvals from other public agencies are not necessary. The project would require the following discretionary approvals from the City of Hayward:

- Site Plan Review Application
- Density Bonus Application
- Other permits required based on the analysis herein;

In addition to the discretionary approvals and permits listed above, the project would require several ministerial permits from the City of Hayward. For example, ministerial demolition and building permits would be needed from the City's Building Division, following review and approval of detailed demolition and building construction plans. A Tree Removal Permit would be required for the removal of any protected tree as defined by Article 15 of the Hayward Municipal Ordinance, Tree Preservation. As discussed in Section 4, *Biological Resources*, all nine on-site trees are deemed protected. A ministerial sewer connection permit would be required for the project to connect with the City's existing sanitary sewer system. Ministerial encroachment permits for work in the City's right-of-way would be required. Examples of project-related work proposed in the City's right-of-way include sidewalk improvements along the frontage of the proposed buildings and the curb and street improvements on the adjacent roadways.

11. Have California Native American Tribes Traditionally and Culturally Affiliated with the Project Area Requested Consultation Pursuant to Public Resources Code Section 21080.3.1?

On August 5, 2019, the City of Hayward sent the Ione Band of Miwok Indians an Assembly Bill (AB) 52 notification letter via certified mail. Under AB 52, Native American tribes have 30 days to respond and request further project information and request formal consultation. The City did not receive a request for formal consultation under AB 52. Copies of AB 52 correspondence for this project are included in Appendix B.

Environmental Factors Potentially Affected

This project would potentially affect the environmental factors checked below as indicated by the checklist on the following pages.

☐ Aesthetics
☐ Agriculture and Forestry Resources
☐ Air Quality
■ Biological Resources
■ Cultural Resources
☐ Energy
☐ Geology/Soils
☐ Greenhouse Gas Emissions
☐ Hazards & Hazardous Materials
☐ Hydrology/Water Quality
☐ Land Use/Planning
☐ Mineral Resources
■ Noise
☐ Population/Housing
☐ Public Services
☐ Recreation
■ Transportation
■ Tribal Cultural Resources
☐ Utilities/Service Systems
☐ Wildfire
■ Mandatory Findings of Significance

Determination

On the basis of this initial evaluation:

☐ I find that the Proposed Project qualifies as a Residential Project pursuant to a Specific Plan and is EXEMPT from CEQA in accordance with CEQA Guidelines Section 15182.

■ I find that pursuant with CEQA Guidelines Section 15183, the Proposed Project is a Project consistent with a Community Plan or Zoning, that there are no project-specific significant effects which are peculiar to the project or its site, and NO ADDITIONAL ENVIRONMENTAL REVIEW IS REQUIRED.

☐ I find that the Proposed Project qualifies as an Infill Project that would result in new specific effects. However, these effects would be substantially mitigated under uniformly applicable development policies. NO FURTHER REVIEW required.

☐ I find that the Proposed Project qualifies as an Infill Project but would result in new specific effects that would not be substantially mitigated under uniformly applicable development policies. A STREAMLINED MITIGATED NEGATIVE DECLARATION is recommended.

☐ I find that the Proposed Project qualifies as an Infill Project but would result in new specific effects that would not be substantially mitigated under uniformly applicable development policies, and an ENVIRONMENTAL IMPACT REPORT is required.

October 1, 2019

Signature

Date

Marcus Martinez

Associate Planner

Printed Name

Title

This report follows a checklist format that outlines performance standards for projects eligible for streamlined review under the California Environmental Quality Act (CEQA). A consistency checklist may be prepared by a lead agency to streamline the environmental review process for eligible projects by limiting the topics subject to review at the project level where the effects of development have been addressed in a previous Environmental Impact Report (EIR). In accordance with CEQA Guidelines Section 15183, if the project would result in new specific effects or more significant effects, and uniformly applicable development policies or standards would not substantially mitigate such effects, those effects are subject to CEQA. With respect to the effects that are subject to CEQA, the lead agency is to prepare a Mitigated Negative Declaration or EIR if the written checklist shows the effects of the infill project would be potentially significant.

The checklist concludes that the project would not have significant effects on the environment that either have not been analyzed in a prior EIR or are more significant than previously analyzed, or that uniformly applicable development policies would not substantially mitigate. Pursuant to Public Resources Code (PRC) Section 21094.5, such effects are exempt from further CEQA review.

California PRC Section 21083.3 also limits the application of CEQA to effects on the environment peculiar to the parcel or to the project and that were not addressed as significant effects in the prior environmental impact report, or about which substantial new information shows will be more significant than described in the prior EIR, when projects are consistent with the development density established by existing zoning, community plan, or general plan policies for which an EIR was certified (CEQA Guidelines Section 15183[a], also PRC Section 21083.3[b]).

This CEQA Guidelines Section 15183 Consistency Checklist has been prepared in accordance with PRC Section 21000 et seq. and the CEQA Guidelines, California Code of Regulations Section 15000 et seq.

Environmental Checklist

Pursuant to CEQA Guidelines Section 15183, projects consistent with the development density established by existing zoning, community plan, or general plan policies for which an EIR was certified may not require additional review unless there may be project-specific effects that are peculiar to the project or site that were not adequately addressed in the EIR for the general plan. In approving a project meeting the requirements of Section 15183 of the CEQA Guidelines, a public agency must limit its examination of environmental effects to those the agency determines in an Initial Study or other analysis:

1. Are peculiar to the project or the parcel on which the project would be located
2. Were not analyzed as significant effects in a prior EIR on the zoning action, general plan, or community plan, with which the project is consistent
3. Are potentially significant off-site impacts and cumulative impacts which were not discussed in the prior EIR prepared for the general plan, community plan or zoning action
4. Are previously identified significant effects which, as a result of substantial new information which was not known at the time the EIR was certified, are determined to have a more severe adverse impact than discussed in the prior EIR

The purpose of this checklist is to assess consistency between the proposed project and the City of Hayward General Plan, and to compare the proposed project with the effects above to determine if additional environmental review is required under CEQA, in accordance with CEQA Guidelines Section 15183.

Relationship of the Proposed Project to Previous EIR Analysis

The City of Hayward adopted the *Hayward 2040 General Plan* on July 1, 2014. It includes goals and polices that convey the City’s long-term vision and guide local decision making to reach that vision. The General Plan EIR assessed impacts from the implementation of the General Plan and was certified in 2014 when then City Council approved the General Plan.

Consistency of the Project with Adopted City Plans and Ordinances

City of Hayward 2040 General Plan

The project would be located entirely in the City of Hayward. The General Plan is the fundamental document that governs land use development. It includes goals and policies relating to economic vitality, land use, growth management, transportation, parks, open space, conservation, safety, noise, public facilities, and utilities. The project would be required to abide by all applicable goals and policies in the adopted General Plan. The General Plan land use designation for the project site is Sustainable Mixed-Use (SMU) which allows for a density range of 4.3 to 100 dwelling units per net acre, and up to a maximum Floor Area Ratio (FAR) of 2.0. The Sustainable Mixed-Use designation generally applies to areas near regional transit that are planned as walkable urban neighborhoods and includes development such as mixed-use buildings that contain commercial uses on the ground floor and residential units on upper floors. Consistent with General Plan Policies H-3.5, LU-1.3, and LU-1.4, the project would add residential density at an underutilized site. Consistent with Policy H-3.4, the project would add housing units in proximity to the services available in the Sustainable Mixed-Use district, located nearby along Mission Boulevard. Consistent with Policy LU-1.7, the project would be required to conform to applicable design guidelines.

South Hayward BART/Mission Boulevard Form-Based Code Supplemental EIR (SEIR)

The project site is located within the South Hayward BART/Mission Boulevard Form-Based Code area. In 2011, the Hayward City Council adopted the SEIR for the Form-Based Code, which was intended to replace the zoning and related regulations associated with an approximately 240-acre area along Mission Boulevard and surrounding the South Hayward BART station. The SEIR analysis was based on two separate CEQA documents, the South Hayward BART/Mission Boulevard Concept Design Plan Program EIR and the Route 238 Bypass Land Use Study Program EIR. Under the South Hayward BART/Mission Boulevard Form-Based Code, the project site is located in the Urban Center Zone (S-T5).

City of Hayward South Hayward BART/Mission Boulevard Form-Based Code

The project complies with applicable provisions of the City of Hayward Form Based Code, and includes the approval of permits, described under *Project Approvals* with the exception of the two requested concessions/incentives eligible through state Density Bonus law. The project meets standards for lot area, open space and building height consistent with Urban Center Zone (S-T5) zoning; satisfies applicable requirements for the S-T5 zoning district under Hayward Municipal Code Section 10-24.200; and, with the exception of the two requested concessions for increased density, complies with applicable provisions of the Hayward Municipal Code. Table 2 shows the project's consistency with S-T5 District development standards listed the Hayward Municipal Code, specifically Chapter 10, Article 24, *South Hayward BART/Mission Boulevard Form-Based Code*.

Table 2 Consistency with Development Standards

Standards	Allowed	Proposed
Density (du/acre)	35-55	140[1] total units for a density of 63 du/acre
Building Height maximum	5 stories	5 stories
Lot Coverage Maximum (percentage)	90%	38.6%
Front setback (feet)	2' minimum; 12' maximum	10' 5.5"; 3' 9", 10' 0.5"
Rear setback (feet)	3' minimum	34' 5.5"
Side setback (feet)	0' minimum; 24' maximum	36' 5.5", 51' [2]
Vehicle Parking Spaces maximum	210	101
Open Space minimum (square feet)	9,6273	14,080

[1] Consistent with the Density Bonus Law (California Government Code Sections 65915 – 65918), the applicant proposes a 15% density increase.

[2] Consistent with Hayward Municipal Code Chapter Article 19, Density Bonus Ordinance and Government Code Section 65915, the applicant requests a concession/incentive from the required side yard setback maximum (see below for more details).

[3] Common open space required equals 10% of the total lot area, per Hayward Municipal Code Section 10-24.230 (c).

DENSITY BONUS

Given the size of the project site and the residential density allowed in the S-T5 zoning district, the site can accommodate a maximum of 121 dwelling units (55 units/net acre x 2.21 acres). However, the applicant proposes that all 140 units would be restricted for low-income and/or very low-income households. Per California Density Bonus Law (California Government Code Sections 65915 – 65918), this provision of affordable units allows the project to be eligible for up to a 35 percent density bonus increase above the base density allowed. Section 10-19.190 and State law allow up to two concessions or incentives (reductions, modifications, and/or waivers in applicable development standards) for this proposed project provided said concessions/incentives result in identifiable and actual cost reductions. Accordingly, the applicant has requested the following concessions/incentives:

1. **Building Disposition.** For the S-T5 zoning district, the FBC establishes a maximum setback of 24-feet along the side property lines. The applicant is proposing a side yard setback of 36- to 51-feet along the northern (right side facing project) property line and 51-feet along the southern (left side facing project) property line in order to accommodate Fire Department, waste management, and two-way vehicular access around the principal building. Applicant is requesting to allow for the increased setback beyond the 24-foot maximum to accommodate the required accesses mentioned above.
2. **New Thoroughfare Designation.** Figure 1-2 and Figure 1-3 of the FBC indicate the location of a new thoroughfare to be created along the rear of the project site referenced as Plan ST-56-34-BR. The plan detail calls for the construction of a 56-foot wide street with two-way vehicular traffic, on-street parking, planting strips and sidewalks on each side of the street - across the width of the project site. Applicant is requesting that the thoroughfare requirement to be waived as it will significantly increase costs to the project and reduce the overall density of the project impacting the financing of the project. In addition, if built, the thoroughfare will start and end at dead-end, or lead into the new SoHay Park, which is not programmed for automobile circulation.

CEQA Guidelines Updates

The *CEQA Guidelines* have been updated by the State of California; the revised *Guidelines* are in effect as of December 2018. Responses to new impact questions in the updated guidelines have been incorporated into individual environmental impact sections. Specifically, impacts related to wildfire are analyzed in Section 20, *Wildfire*, and impacts related to energy are analyzed in Section 6, *Energy*.

In addition, the updated *CEQA Guidelines* and Senate Bill 743 changed the criteria for determining what constitutes a significant transportation-related environmental impact to rely upon quantification of vehicle miles traveled (VMT) instead of level of service. Section 15064.3(c) states that the requirement to use the VMT criteria only applies on and after July 1, 2020. Although a lead agency may elect to apply the criteria in Section 15064.3(b) sooner, the City of Hayward has not adopted these criteria as of the date of this report. Therefore, this section does not apply to the proposed project or the analysis in this Environmental Consistency Checklist.

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1 Aesthetics

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project:					
a. Have a substantial adverse effect on a scenic vista?	☐	■	☐	☐	☐
b. Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	■	☐	☐	☐
c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	■	☐	☐	☐
d. Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?	☐	■	☐	☐	☐

Pursuant to California state law (SB 743), aesthetic and parking impacts of a residential, mixed-use residential, or employment center project on an infill site within a transit priority area shall not be considered significant impacts on the environment (PRC Section 21099(d)(1)). Therefore, all aesthetic impacts would be less than significant by statute. As the proposed development consists of a mixed-use development on a vacant infill site, where at least 75 of the perimeter of the site adjoins, or is separated only by improved public right-of-way from, parcels that are developed with qualified urban uses and is approximately one-half mile from the South Hayward BART Station, the project meets the criteria of SB 743. It should also be noted that, pursuant to CEQA Statute Section

21099(d), in this context “aesthetic impacts do not include impacts on historical or cultural resources.” These impacts are discussed in Section 5, *Cultural Resources*.

Project-Specific Impacts

a-d) As discussed above, pursuant to SB 743, these impacts are less than significant.

Conclusion

The project-specific impacts related to aesthetics would be less than significant, and therefore not be more severe than those identified in the previous environmental documents, and the project would not result in new specific effects not addressed in that analysis. No new mitigation measures are warranted. Accordingly, no additional review is required.

2 Agriculture and Forestry Resources

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project:					
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	■	☐
b. Conflict with existing zoning for agricultural use or a Williamson Act contract?	☐	☐	☐	■	☐
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)); timberland (as defined by Public Resources Code Section 4526); or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	■	☐
d. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	■	☐
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	■	☐

Analysis in Previous Environmental Documents

The General Plan EIR discusses agricultural impacts in the Agricultural and Forestry resources section, on pages 6-1 through 6-6, and identifies a less than significant impact to agricultural and forestry resources.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine if project-specific impacts would occur that are 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a. *Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?*

b. *Would the project conflict with existing zoning for agricultural use or a Williamson Act contract?*

c. *Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)); timberland (as defined by Public Resources Code Section 4526); or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?*

d. *Would the project result in the loss of forest land or conversion of forest land to non-forest use?*

e. *Would the project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?*

☑ **ANALYZED IN THE PRIOR EIR**

The project site is in the urbanized, relatively densely developed city of Hayward. As shown in Figure 3-4 of the Hayward 2040 General Plan EIR, the project site is designated Sustainable Mixed-Use (SMU) which allows for multi-story apartment and condominium buildings, commercial buildings, and mixed-use buildings that contain commercial uses on the ground floor and residential units or office space on upper floors. The project site is surrounded by a mix of, single- and multi-family residential to the west, and commercial uses along the southern, eastern and northern boundaries of the project site. Approximately 75 percent of the site is surrounded by development. The project consists of an infill development on vacant land and would not result in the conversion of existing farmland or change of agriculture resources to a non-agricultural use. As stated in the General Plan EIR, no lands in the Hayward Planning Area are designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. As the proposed project is an infill development, it would not encroach on existing or potential grazing land. There would be no impact to agricultural resources, forest land, or land under a Williamson Act contract beyond those identified in the previous environmental documents.

Conclusion

The project would have no new significant or substantially more severe or peculiar impacts to agricultural resources nor are there any potentially significant off-site impacts, cumulative impacts, previously identified significant effects, which were not discussed in the prior environmental documents. No previously identified significant effects are identified, as a result of substantial new information that was not known at the time of the previous environmental review, that are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

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3 Air Quality

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project:					
a. Conflict with or obstruct implementation of the applicable air quality plan?	☐	■	☐	☐	☐
b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	■	☐	☐	☐
c. Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	■	☐
d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☐	■	☐

Analysis in Previous Environmental Documents

The General Plan EIR discusses Air Quality impacts on pages 7-1 through 7-40 and finds that odor-related under development envisioned in the General Plan impacts would be less than significant. Impacts associated with short-term construction, long-term operational emissions, and health risk exposure to toxic air contaminants (TAC) and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) from future development across the City would be significant and unavoidable, even after application of all feasible mitigation. The General Plan EIR includes the incorporation of specific source-reduction and receptor-oriented risk reduction measures and best management practices (BMP) in the General Plan, although the overall effectiveness of these measures in reducing communitywide health risk could not be quantified at the program level. Therefore, air quality impacts from emissions would remain significant and unavoidable. Because the General Plan would not be fully consistent with the primary goals of the Bay Area Clean Air Plan with the elevated emissions projected, the General Plan EIR found that this consistency impact would be significant and unavoidable.

The following summarizes the applicable analysis in the General Plan EIR and provides a review to determine if project-specific impacts would occur that are 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a. Would the project conflict with or obstruct implementation of the applicable air quality plan?

☑ LESS THAN SIGNIFICANT

The primary goals of the Bay Area Air Quality Management District's (BAAQMD) 2010 Clean Air Plan are as follows:

- Attain air quality standards
- Reduce population exposure and protect health in the Bay Area
- Reduce greenhouse gas (GHG) emissions and protect the climate

As addressed in the General Plan EIR, buildout of the General Plan would be substantially consistent with the Clean Air Plan, but the General Plan would still have significant and unavoidable impacts associated with short-term construction and long-term operational emissions, as well as health risk exposure associated with TACs and $PM_{2.5}$. Because the General Plan exceeds BAAQMD thresholds of significance even after implementation of all feasible mitigation, it would not be fully consistent with the Bay Area Clean Air Plan goals.

The General Plan does not include control measures (measures designed to reduce emissions of a particular compound or pollutant) that apply directly to individual development projects, such as those proposed with the Hayward Mission Family Apartments development. Instead, the emission control strategy includes compliance with the Clean Air Plan's air quality control measures. These measures fall into five categories: stationary source measures, transportation control measures, mobile-source measures, land use and local impact measures, and energy and climate measures. The General Plan policies and implementation programs are consistent with these control measures. Any project that would not support these measures would not be considered consistent with the Clean Air Plan. On an individual project basis, consistency with BAAQMD quantitative thresholds is interpreted as demonstrating support for the Clean Air Plan goals. The project would not generate emissions exceeding those anticipated by the General Plan EIR, as discussed under criterion (b), and therefore, the project would not conflict with the Clean Air Plan's goals. For this reason, this impact would be less than significant.

It should be noted the most current clean air plan, *Spare the Air Cool the Climate: A Blueprint for Clean Air and Climate Protection in the Bay Area* (2017 Clean Air Plan) was adopted by BAAQMD in April 2017 (BAAQMD 2017a). The legal impetus for the 2017 Clean Air Plan is was to update the 2010 Clean Air Plan to comply with state air quality planning requirements codified in the California Health and Safety Code. Although the General Plan EIR was prepared before BAAQMD adopted the 2017 Clean Air Plan and does not evaluate potential conflicts with the 2017 Clean Air Plan, the 2017 Clean Air Plan utilizes the growth and population forecasts that were part of the City's General Plan.

Given that the proposed development is consistent with the density range of the General Plan, the project is consistent with the 2017 Clean Air Plan; therefore, the project would be consistent with growth and population forecasts used in the 2017 Clean Air Plan and would not conflict with or obstruct the implementation of an applicable air quality plan. Impacts would be less than significant.

b. Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

☑ LESS THAN SIGNIFICANT

The General Plan EIR assesses air quality impacts on a programmatic level and recognizes that site-specific impacts are assessed during project review. To determine if further review under CEQA is necessary, the project was compared to the BAAQMD air pollutant screening criteria (BAAQMD 2017b). This preliminary screening is intended as a conservative indication of whether the proposed project would result in the generation of construction-related criteria pollutants and/or precursor emissions. In order for the screening criteria to apply, construction-related activities may not include demolition, simultaneous occurrence of more than two construction phases, extensive site preparation, extensive material transport, or simultaneous construction of more than one land use type. Although this project involves a mixed-use development that would construct commercial and residential uses on the same site, the screening criteria specifically states that this does not apply to high-density infill development. The project is located in the Urban Center Zone (S-T5) which allows for a density range of 35-55 dwelling units per net acre to encourage and concrete high-density development within close proximity of the South Hayward BART station and mass transit services, is located on an infill site that is approximately 75 percent surrounded by development. As such, the project would be consistent with the high-density infill development screening criteria.

As amid-rise (three to ten story) apartment development containing 140 rental apartment units, the project falls below the screening criteria of 494 units for operational criteria pollutants and 240 units for construction-related emissions (BAAQMD 2017b). Additionally, the project proposes an approximately 2,700-square-foot daycare and 1,800 square feet of commercial space. The screening criteria for a daycare center is 53,000 square-feet for operational criteria pollutants and 277,000 square feet for construction-related emissions; while the screening criteria for retail (i.e. regional shopping center/strip mall) is 99,000 square feet for operational criteria pollutants and 277,000 square feet for construction related emissions. Therefore, these components also fall below the BAAQMD screening criteria for operational and construction criteria pollutants, as shown in Table 3. Projects that do not exceed the BAAQMD screening criteria are considered to result in less than significant cumulative impacts to air quality from criteria air pollutants. As the project would not exceed BAAQMD screening criteria, it would have a less than significant effect on air quality from criteria air pollutants and air quality violations. Furthermore, the City would incorporate its standard conditions of approval to control construction-related dust, as indicated below, which would further reduce impacts. Impacts would be less than significant and within the scope of the impacts discussed in the General Plan EIR.

Table 3 BAAQMD Screening Thresholds

Land Use Type	Operational Criteria Pollutant Screening Size	Construction-Related Screening Size
Mid-rise Apartment Building	494 dwelling units	240 dwelling units
Daycare center	53,000 square feet	277,000 square feet
Regional shopping center/strip mall	99,000 square feet	277,000 square feet

Source: BAAQMD 2017b

Standard Conditions of Approval

Consistent with General Plan Policies NR-2.2 and NR-2.7, in order to meet the BAAQMD fugitive dust threshold, the following BAAQMD Basic Construction Mitigation Measures shall be implemented:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
- All visible mud or dirt tracked-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 mph.
- All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible.
- Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- A publicly visible sign shall be posted with the telephone number and person to contact at the City of Hayward regarding dust complaints. This person shall respond and take corrective action within 48 hours. The BAAQMD phone number shall also be visible to ensure compliance with applicable regulations.

Consistent with General Plan Policy NR-2.2 and NR-2.12, the project contractor shall ensure all off-road diesel-powered construction equipment of 50 horsepower or more used for the project meet the California Air Resources Board (CARB) Tier 4 emissions standards or equivalent.

c. *Would the project expose sensitive receptors to substantial pollutant concentrations?*

☑ ANALYZED IN THE PRIOR EIR

The General Plan EIR indicates that implementation of development projects consistent with the proposed General Plan could involve placing sensitive receptors near major roadways, railroads, or other sources of TAC and $PM_{2.5}$ emissions (City of Hayward 2014b). The General Plan functions as a community risk reduction plan, which is a comprehensive strategy to minimize community health risks associated with TACs and $PM_{2.5}$ emissions. Policy NR-2.15 of the General Plan contains a mandate to maintain and implement the General Plan as Hayward's community risk reduction strategy to reduce health risks associated with TACs and $PM_{2.5}$ emissions in existing and new developments. However, the General Plan EIR found that this impact would be significant and unavoidable due to uncertainties of the model inputs used for the programmatic analysis.

The project would not include sources of stationary equipment that would require an air permit from the BAAQMD. Additionally, the project would be a residential mixed-use development, typical of a land use that would not generate of toxic air contaminants. Therefore, although the project would involve placing new sensitive receptors (residences and day care centers) near a major roadway (Mission Boulevard) and railroad, the project would not add new sources of TACs or $PM_{2.5}$

that would exacerbate health risks beyond the risks assumed in the General Plan EIR. Impacts would not be more significant than what was analyzed previously.

Although CEQA does not require analysis of the environment on the project (California Building Industry Association v. BAAQMD [2015] 62 Cal.4th 369), the following information is presented for informational purposes. A site-specific health risk assessment (HRA) was prepared for the project site by EFI Global in May 2019 as required by HMC Section 10-24.296, which requires properties located within 500 feet of the curb line of Mission Boulevard to address health risks associated with traffic-related emissions (EFI Global 2019; Appendix C). The summation of carcinogenic risk from diesel particulate matter for the worst-case ground level location at the site is below the BAAQMD threshold of 10 per one million for all scenarios. A maximum chronic hazard index of 0.003 would occur for the site's worst-case location, which is below the BAAQMD threshold of 1.0. No project-specific or site-specific measures are required to reduce health risk at the side. However, the requirements of HMC Section 10-24.296 would apply, which require an efficiency standard of Minimum Efficiency Reporting Value (MERV) 13 or equivalent.

d. Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

☑ ANALYZED IN THE PRIOR EIR

As addressed in the General Plan EIR, implementation of development projects, such as the Hayward Mission Family Apartments project, that are consistent with the proposed General Plan would not create objectionable odors affecting a significant number of people (City of Hayward 2014b). According to the BAAQMD, odor-generating projects include wastewater treatment plants, landfills, confined animal facilities, composting stations, food manufacturing plants, refineries, and chemical plants, none of which are proposed (BAAQMD 2017a). The project would not emit odors beyond those previously assessed; no impacts beyond those previously analyzed would occur.

Conclusion

Based on the air quality policies in the General Plan EIR along with the project-specific comparison to BAAQMD screening criteria included above, no significant impacts or peculiar circumstances associated with the proposed project would occur. The project would be required to comply with applicable City and BAAQMD standards, and, thus, would not result in new significant or substantially more severe or peculiar impacts to air quality, nor are there any potentially significant off-site impacts, cumulative impacts, or previously identified significant effects, which were not discussed in the prior environmental documents. Also, there are no previously identified significant effects which, because of substantial new information that was not known at the time of the previous environmental review, are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

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4 Biological Resources

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project:					
a. 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?	☐	☐	☐	☐	■
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	■	☐	☐
c. Have a substantial adverse effect on state or 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?	☐	☐	■	☐	☐
d. 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?	☐	☐	■	☐	☐

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☐	■
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	■	☐	☐

Analysis in Previous Environmental Documents

The General Plan EIR discusses Biological Resources impacts on pages 8-1 through 8-32 and finds impacts to be less than significant. The Background Report for the Hayward 2040 General Plan described the various biological resources within the Hayward Planning Area. Table 7-2 of the 2040 General Plan Background Report identifies the special status species that are known or that could potentially occur in the Hayward Planning Area (City of Hayward 2014c). The table shows 25 species that have either a moderate or high potential to occur in the Planning Area, including two species that have been observed in or in close proximity to the Planning Area: the Central California Coastal Steelhead in San Lorenzo Creek, and the Pallid Bat in an undisclosed location.

The Background Report for the Hayward 2040 General Plan states that riparian forests line all creeks in the Hayward Planning Area. This includes San Lorenzo Creek, Castro Valley Creek, Ward Creek, and other small seasonal creek segments in the area. The General Plan EIR evaluated impacts to riparian habitat and other sensitive natural communities and found that with implementation of policies included in the Hayward 2040 General Plan, impacts would be less than significant.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine if project-specific impacts would occur that are 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a. *Would the project 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?*

☑ SUBSTANTIALLY MITIGATED BY UNIFORMLY APPLICABLE DEVELOPMENT POLICIES

Rincon Consultants conducted a biological reconnaissance survey and a review of agency databases and relevant literature in August 2019, in accordance with General Plan Policy NR-1.3 (Sensitive Species Identification, Mapping, and Avoidance), which states that the City is required to retain a qualified biologist to identify, map, and make recommendations to avoid sensitive biological resources for each individual development proposed within the Hayward Planning Area. The literature review included database research on special-status biological resource occurrences within the *Hayward, California* U.S. Geological Survey (USGS) 7.5-minute quadrangle and surrounding eight quadrangles. Seventy special-status plant species and 82 special-status animal species have been documented previously in the regional vicinity of the project site. These species were evaluated for the potential to occur on the project site based on the habitat present on the project and the project site's general condition and location.

The majority of the project site consists of ruderal vegetation, ornamental trees, and non-native annual grasses. As shown in Figure 7-1 of the General Plan EIR, the project site is identified as a mix of ruderal and developed area. Non-native annual grassland communities observed in the project site are dominated by weedy herbaceous plants such as wild oats (*Avena spp*.), ripgut brome (*Bromus diandrus*), bull mallow (*Malva nicaeensis*), cut-leaf geranium (*Geranium dissectum*), mustards (*Brassica spp*.), and wild radish (*Raphanus sativus*).

Special-status Plants

Seventy special-status plant species were found to have potential to occur in the region (CDFW 2019, CNPS 2019, USFWS 2019). All of the reported species have specific habitat requirements including such factors as soil type, elevation and aspect among others. The disturbed existing conditions on site and the lack of appropriate soils and native vegetation communities on the site generally preclude the potential for rare plants to occur on the site. Additionally, none of the 70 special-status plant species were observed during the reconnaissance survey. Therefore, Rincon biologists determined that no special-status species have potential to occur within or adjacent to the project site.

Special-status Wildlife

The review of the resource agency databases for known special-status animal occurrences within the nine USGS quadrangles containing and surrounding the project site identified 83 special-status animal species (CDFW 2019, USFWS 2019). This list was reviewed and refined according to the potential for species to occur on the project site based on the presence and quality of habitats within the project site. The site is highly disturbed and consists of predominantly ruderal vegetation. Non-native annual grassland covers the site and is regularly disturbed by mowing, while other vegetation is limited to ornamental trees and some plantings. The site has no natural or native vegetation communities that would support special status animal species. For those select few special status species that can occur in disturbed or ruderal areas (such as burrowing owl), the site is sufficiently isolated from existing natural areas, and surrounded with urban residential, commercial and transportation development, that access to the site is significantly restricted. The site is not considered viable to support federal or state listed species or other special status animals. Therefore, all 82 special-status animal species were excluded from potentially occurring on the project site based on a lack of suitable habitat conditions and the isolation of the site from natural habitat in the region.

Although vegetation communities observed on the project site are primarily non-native, ornamental, and/or ruderal, the site could be used by numerous species of migratory birds that utilize sparse ground cover or ornamental shrubs and landscaping as nesting habitat. California Fish and Game Code Section 3503 protects native bird nests. Migratory nesting birds that could nest in this type of habitat and that were observed on the site during the reconnaissance survey include western scrub jay (*Aphelocoma californica*) and Anna's hummingbird (*Calypte anna*). Many other species are expected to occur in the area and may nest in the project site, including American crow (*Corvus brachyrhynchos*), house finch (*Haemorhous mexicanus*), and American robin (*Turdus migratorius*). The nesting season generally extends from February through August in California but can vary based upon annual climatic conditions. Thus, construction activities could result in impacts to birds or their nests as the result of tree removals or disturbance related nest abandonment. However, the following City of Hayward standard condition of approval would ensure no violations of the California Fish and Game Code occur as a result of project development. With compliance with this uniformly applicable development policy, impacts to nesting birds would be less than significant.

Standard Condition of Approval

> If project construction activities occur between February 15 and August 31, a qualified biologist shall conduct a pre-construction survey for nesting birds no more than 14 days prior to construction. The survey shall include the entire project site and a 300-foot buffer to account for nesting raptors. If nests are found, the qualified biologist shall establish an appropriate species-specific avoidance buffer of sufficient size to prevent disturbance to the nest by project activity (up to 300 feet for raptors, up to 150 feet for all other birds). The qualified biologist shall perform at least two hours of pre-construction monitoring of the nest to characterize "typical" bird behavior.
>
> During construction, if active nests are present, the qualified biologist shall monitor the nesting birds to determine if construction activities are causing any disturbance to the bird and shall increase the buffer if it is determined the birds are showing signs of unusual or distressed behavior associated with project activities. Atypical nesting behaviors that may cause reproductive harm include, but are not limited to, defensive flights, vocalizations directed towards project personnel/activities, standing up from a brooding position, and flying away from the nest. The qualified biologist shall have authority, through the resident engineer, to order the cessation of all project activities if the nesting birds exhibit atypical behavior that may cause reproductive failure (nest abandonment and loss of eggs and/or young) until a refined appropriate buffer is established. To prevent encroachment, the established buffer(s) should be marked clearly by high visibility material. The established buffer(s) should remain in effect until the young have fledged or the nest has been abandoned, as confirmed by the qualified biologist. Any sign of nest abandonment should be reported to the City and CDFW within 48 hours. The monitoring biologist, in consultation with the resident engineer and project manager shall determine the appropriate protection for active nests on a case-by-case basis using the criteria described above.

b. Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

☑ NO IMPACT

Based on the literature review and reconnaissance survey conducted by Rincon Consultants on August 14, 2019, no riparian habitats or sensitive natural communities are present in the project area. No impacts would occur from project activities.

c. *Would the project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?*

☑ NO IMPACT

No state or federally protected wetlands as defined by Section 404 of the Clean Water Act occur at or adjacent to the project site; therefore, no impacts to state or federally protected wetlands would occur.

d. *Would the project 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?*

☑ NO IMPACT

The project area consists of disturbed areas with primarily non-native annual and weedy species with some ornamental, landscaped vegetation dispersed throughout. Land uses surrounding the project site include high density residential, commercial, and transportation uses in an urban setting, with no connectivity to natural habitats. Therefore, the site is not expected to support wildlife movement. No impacts to wildlife movement corridors would occur as a result of project activities.

e. *Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?*

☑ SUBSTANTIALLY MITIGATED BY UNIFORMLY APPLICABLE DEVELOPMENT POLICIES

Hayward Municipal Code Chapter 10, Article 15, Tree Preservation, requires a permit for the removal, destruction, or cutting of branches over one inch in diameter, or disfigurement of any protected tree, among other requirements. Certified arborist, Katie J. Krebs prepared an arborist report in March of 2019 that identified and assessed 18 trees present on the project site and on neighboring sites (Krebs 2019; Appendix A). Nine trees were located on site and nine trees were surrounding the perimeter on neighboring sites. Of the 18 trees surveyed, eight species were identified including several non-native ornamental plantings, and fruit tree species. These trees include fan palm (*Washingtonia spp.*), Evergreen ash (*Fraxinus ehdei*), olive (*Olea europaea*), Canary island date palm (*Phoenix canariensis*), *Prunus spp*., ornamental pear (*Pyrus calleryana*), London plane (*Plantanus x hispanica*), and loquat (*Eriobtrya spp.*).

Under the City of Hayward Tree Ordinance, Article 15, Section 10-15.013, trees with a minimum trunk diameter, measured at 54 inches above natural grade, of eight inches are deemed *Protected, as well as native California trees that have reached a minimum of four inches of diameter trunk size*. In accordance with this definition, as shown in Table 4, all nine of the trees on the project site are considered *Protected*.

Table 4 Location and Number of Trees to be Removed and Preserved

	On-Site Trees	Off-Site Trees Along Perimeter of Project Site	Total Trees
Existing number of trees	9	9	**18**
Existing number of protected trees	9	3	**12**
Number of trees to be removed	9	0	**9**
Number of protected trees to be removed	9	0	**9**
Number of trees to be preserved	0	9	**9**
Number of protected trees to be preserved	0	3	**3**

Source: Krebs 2019

As shown in Table 4, the proposed project would involve the removal of all nine trees on-site, of which all are considered protected. The total value of all existing trees on-site, excluding trees outside of the property, has been appraised at $15,595 (Krebs 2019; Appendix A). To mitigate the removal of trees, the landscape plan, as shown in Figure 10, includes planting a total of 65 trees with a total value of $27,800. The City would require adherence to the recommendations in the Arborist Report, through standard conditions of approval listed below. The Arborist Report includes tree preservation guidelines to protect tree root zones, inspections to assure implementation, appropriate root cutting and pruning methods, and monitoring by a qualified arborist. Additionally, the value of the proposed replacement trees is greater than the value of those trees which would be removed as planned under the proposed project. With implementation of the standard conditions of approval to comply with the arborist's recommendations, the project would be consistent with the City's tree preservation ordinance. Therefore, project impacts would be substantially mitigated by uniformly applicable development policies.

Standard Conditions of Approval

- Trees to be retained shall be preserved in accordance with the Tree Preservation Ordinance. Prior to the commencement of clearing and grading operations, tree protection measures in compliance with the project arborist's recommendations and the City codes shall be installed.
- A tree removal permit shall be obtained prior to the removal of any tree, and prior to the issuance of any grading and/or building permits.

f. Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

☑ NO IMPACT

No habitat conservation plans, natural community conservation plans, or other similar plans are in place that govern activities on the project site. Therefore, the project would not be in conflict with any habitat conservation plans and no impact would occur.

Conclusion

With incorporation of the City of Hayward’s standard conditions of approval described in this section, the project would have no new significant or substantially more severe or peculiar impacts to biological resources, nor are there any potentially significant off-site impacts, cumulative impacts, or previously identified significant effects, which were not discussed in the prior environmental documents. Also, there are no previously identified significant effects which, because of substantial new information that was not known at the time of the previous environmental review, are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

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5 Cultural Resources

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project:					
a. Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☐	☐	■	☐	☐
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☐	☐	☐	■
c. Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☐	■

Analysis in Previous Environmental Documents

The General Plan EIR analyzes Cultural Resources on pages 12-1 through 12-13 and finds that impacts to site of local importance, overall historic setting, and previously undiscovered archaeological resources would be less than significant and impacts to paleontological resources would be less than significant.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine if project-specific impacts would occur that are 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a. *Would the project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?*

☑ NO IMPACT

The project site is currently vacant and contains no built-environment structures, thus, the project would have no impact to historical built-environment resources. Archaeological resources that may be considered historical resources are covered under criterion (b) below.

b. Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

c. Would the project disturb any human remains, including those interred outside of formal cemeteries?

☑ SUBSTANTIALLY MITIGATED BY UNIFORMLY APPLICABLE DEVELOPMENT POLICIES

Rincon Consultants, Inc. conducted a cultural resources study of the project site to identify potential archaeological resources and human remains that may be impacted by the project (Haas et al. 2019; Appendix D). The study included a cultural resources records search at the Northwest Information Center, informal Native American outreach, and a pedestrian survey by a qualified archaeologist. The cultural resources records search, Native American outreach, and pedestrian survey did not result in the identification of cultural resources within the project site. No archaeological resources have been identified within a 0.5-mile radius of the project site. The project area is not known to contain human remains. Nonetheless, the discovery of remains or resources is always a possibility during ground-disturbing activities. With incorporation of the following the City of Hayward's standard condition of approval to account for unanticipated discovery, impacts to archaeological resources and human remains would be mitigated substantially by uniformly applicable development policies.

Standard Condition of Approval

> If human remains, archaeological resources, prehistoric or historic artifacts are discovered during construction or excavation, the following procedures shall be followed: Construction and/or excavation activities shall cease immediately, and the Planning Division shall be notified. A qualified archaeologist shall be retained to determine whether any such materials are significant prior to resuming groundbreaking construction activities. Standardized procedure for evaluation accidental finds and discovery of human remains shall be followed as prescribed in Sections 15064.f and 151236.4 of the California Environmental Quality Act.

Conclusion

A cultural resource assessment of the project area was conducted, and the findings were incorporated into the analysis above. In addition, the City of Hayward's standard condition of approval above would be implemented to reduce impacts to archaeological resources and human remains to less than significant levels. Accordingly, the project would have no new significant or substantially more severe or peculiar impacts to cultural resources, nor are there any potentially significant off-site impacts, cumulative impacts, or previously identified significant effects, which were not discussed in the prior environmental documents. Also, there are no previously identified significant effects which, because of substantial new information that was not known at the time of the previous environmental review, are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

6 Energy

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project:					
a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☐	■	☐
b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	■	☐

CEQA Guidelines Appendix F (Energy Conservation) and the updated Appendix G guidelines published in December of 2018, require that environmental analysis 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.

Energy consumption accounts for energy consumed during construction and operation of the proposed project, such as fuel consumed by vehicles, natural gas consumed for heating and/or power, and electricity consumed for power.

Analysis in Previous Environmental Documents

The General Plan EIR analyzes impacts on Energy on pages 21-9 through 21-24. This discussion addresses the issues of inefficient, wasteful, or unnecessary consumption of energy. The General Plan EIR identifies impacts related to energy consumption as less than significant.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine whether there would be project-specific impacts that are either 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

a. Would the project result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

☑ ANALYZED IN THE PRIOR EIR

Pacific Gas and Electric is the only purveyor of electricity and natural gas in Hayward and it would supply energy to the project site. Construction of the proposed project would result in short-term consumption of energy from the use of construction equipment and processes. The California Green

Building Standards Code includes specific requirements related to recycling, construction materials, and energy efficiency standards that would apply to construction of the proposed project to minimize wasteful, inefficient, and unnecessary energy consumption. In addition, City of Hayward Municipal Code Chapter 10, Article 22, (Green Building Requirements for Private Development) requires that all new multi-family residential projects are GreenPoint rated.

The proposed project would involve the use of energy during construction and operation. Energy use during construction would be primarily from fuel consumption to operate heavy equipment, light-duty vehicles, machinery, and generators. Temporary grid power may be provided to construction trailers or electric construction equipment. Energy use during construction would be temporary. Construction equipment used would be typical of construction projects in the region.

Operation of the proposed project would generate energy demand in the form of transportation fuel from vehicle trips with the additional population anticipated at the project site. In addition to this transportation energy use, operation of the project would require permanent grid connections for electricity and natural gas. Construction of the proposed project would comply with the City's Municipal Code, which incorporates the California Green Building Standards Code. This code requires the provision of electric vehicle charging stations, water efficient plumbing fixtures and fittings, recycling services, and other energy-efficient measures.

Overall, operation of the proposed project would result in consumption of fuels from vehicle trips, and electricity and natural gas from proposed residential buildings. Project energy consumed would represent an incremental increase in energy usage compared to existing conditions, and the proposed project would implement energy-efficient components, including providing electric vehicle parking spaces, installing water efficient and drought tolerant landscaping, and installing energy efficient appliances and light fixtures in each unit to reduce energy demand. The proposed project would also use renewable energy in the form of rooftop solar photovoltaic panels. The General Plan EIR notes that population growth in the city is a key driver for increasing energy demands. The proposed project would increase population density incrementally in the City of Hayward. However, population growth facilitated by the proposed residential units would be consistent with General Plan population growth forecasts. According to the General Plan EIR, the City's energy supply is sufficient to meet the needs of projected growth until 2040 (City of Hayward 2014b) without adding wasteful, inefficient, or unnecessary consumption of energy resources. Therefore, no impacts beyond those analyzed in the General Plan EIR would occur.

b. *Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?*

☑ ANALYZED IN THE PRIOR EIR

The City of Hayward adopted a Climate Action Plan (CAP) in 2009 to bring the City into compliance with Senate Bill (SB) 375 and statewide GHG reduction goals. The CAP was adopted in response to state mandates and regional guidance on reducing GHG emissions (City of Hayward 2014b). While targeted toward reducing citywide GHG emissions, the CAP includes energy efficiency measures to reach emissions reduction targets. Energy-related measures described in the CAP include building energy efficiency strategies, conducting outreach programs to encourage renewable energy installation, and encouraging the use of alternatively fueled construction and landscape equipment. As a part of the General Plan update process for the Hayward 2040 General Plan, the City re-evaluated the greenhouse gas reduction estimates assigned to individual actions contained in the 2009 CAP. This analysis resulted in the development of new and modified actions that were incorporated into the Hayward 2040 General Plan and its overall policy framework. Therefore, the energy efficiency measures contained in the CAP are required and would be adhered to with implementation of the proposed project.

The General Plan EIR analyzed the policies contained within the planning document to identify goals, policies, implementation programs, and potential outcomes that address the significance criteria for impacts related to energy consumption. Several policies in the General Plan aim to avoid or reduce inefficient, wasteful, or unnecessary consumption of energy resources, consistent with the updated CEQA guidelines, including Appendix F of the CEQA guidelines. These policies include actions designed to reduce electricity and natural gas use or to reduce fuel consumption (e.g., less driving), and implementation of these policies and actions would, therefore, reduce energy consumption. Several 2040 General Plan policies (LU-1.1, -1.3, -1.5, -1.6, -1.8, and -1.9) promote local growth patterns and sustainable development practices to reduce resource and energy consumption overall. This is consistent with the type of infill development planned for the proposed project, specifically LU 1-5 for Transit Oriented Development which calls to support high-density transit-oriented development within the City’s Priority Development Areas to improve transit ridership and to reduce automobile use, traffic congestion, and greenhouse gas emissions and NR-2.6 (Greenhouse Gas Reduction in New Development) that aims to reduce potential greenhouse gas emissions by discouraging new development that is primarily dependent on the private automobile; promoting infill development and/or new development that is compact, mixed use, pedestrian friendly, and transit oriented. Other policies focus specifically on energy-efficient design and renewable energy use to reduce wasteful energy consumption. These include policies NR-4.1 through NR-4.15, which define implementation programs to encourage development of green buildings and infrastructure, and to promote collaboration with energy-efficient contractors. Because the proposed project is within the scope of the 2040 General Plan buildout, it would be consistent with these energy-efficiency policies. The proposed project would not interfere with the Hayward 2040 General Plan or the CAP’s energy-efficiency policies and would not conflict with or obstruct the state plan for renewable energy; therefore, no impacts beyond those analyzed in the General Plan EIR would occur.

Conclusion

Impacts of the project would be similar to those identified in the General Plan EIR and would be less than significant. The project would have no new significant or substantially more severe or peculiar impacts, nor are there any potentially significant off-site impacts, cumulative impacts, or previously identified significant effects, which were not discussed in the prior environmental documents. Also, there are no previously identified significant effects which because of substantial new information that was not known at the time of the previous environmental review, are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

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7 Geology and Soils

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project:					
a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:					
1. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?	☐	☐	☐	■	☐
2. Strong seismic ground shaking?	☐	☐	☐	■	☐
3. Seismic-related ground failure, including liquefaction?	☐	☐	☐	■	☐
4. Landslides?	☐	☐	☐	■	☐
b. Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	■	☐
c. 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?	☐	☐	☐	■	☐
d. Be located on expansive soil, as defined in Table 1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☐	■	☐
e. 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?	☐	☐	■	☐	☐

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	■	☐	☐	☐

Analysis in Previous Environmental Documents

The General Plan EIR discusses Geology and Soils impacts on pages 9-1 through 9-18 and concludes that impacts related to geology and soils would be less than significant.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine project-specific would occur impacts that are 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a.1. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?

a.2. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?

☑ ANALYZED IN THE PRIOR EIR

The Hayward Fault is the closest fault line to the project site, located approximately 0.6 mile to the northeast. The General Plan EIR evaluated the potential for fault rupture and strong seismic ground shaking from seismic events. As noted in the General Plan EIR, ground shaking in the Hayward area could cause significant damage, but with implementation of General Plan Policies, impacts would be less than significant. Additionally, the project would be required to be constructed in compliance with the California Building Code to minimize earthquake-related hazards. The project is not within an earthquake fault zone, as defined by the Alquist-Priolo Earthquake Fault Zoning Act, and no known active or potentially active faults exist on the site (California Geological Survey [CGS] 2019). It is located approximately 0.2-mile northeast of a zone of liquefaction potential as shown on the *State of California Seismic Hazard Zones, Hayward Quadrangle, Official Map* (CGS 2003), and there are no known geologic hazards particular to the project site. No impacts beyond those previously analyzed would occur.

a.3. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?

☑ ANALYZED IN THE PRIOR EIR

Figure 9-2 of the 2040 General Plan Background Report shows that the project site is not in an area of moderate, high, or very high liquefaction potential (City of Hayward 2014c). Additionally, the General Plan EIR lists several General Plan Policies that would reduce the risk of seismic-related ground failure to a less than significant level, as described on pages 9-9 through 9-13 of the General Plan EIR. No impacts would occur beyond those analyzed previously.

a.4. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?

☑ ANALYZED IN THE PRIOR EIR

The project site is located in a generally flat area and not surrounded by substantial slopes, as shown in Figure 9-3 of the 2040 General Plan Background Report (City of Hayward 2014c). Consistent with the findings of the General Plan EIR, the risk of landslides on-site is low and impacts due to landslide would be less than significant. No impacts beyond those analyzed previously would occur.

b. Would the project result in substantial soil erosion or the loss of topsoil?

☑ ANALYZED IN THE PRIOR EIR

As stated in the General Plan EIR, areas in Hayward most susceptible to soil erosion include those where new development in hilly areas would require extensive grading (City of Hayward 2014b). The project is located in a generally flat area. Construction of the project would be required to adhere to applicable General Plan policies and building codes including the California Building Code Section 1804 *Excavation, Grading, and Fill*, along with the necessary implementation of a Stormwater Pollution Prevention Plan (SWPPP) required under the National Pollutant Discharge Elimination System (NPDES) program. The SWPPP would contain BMPs to control sediment and reduce erosion during construction. Compliance with these uniformly applicable measures would result in a less than significant impact. Following construction, the majority of the project site would be developed with structures and landscaping, and areas of exposed soils would be minimal to non-existent. Therefore, no impacts beyond those identified in the previous environmental documents would occur.

c. Would the project 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?

☑ ANALYZED IN THE PRIOR EIR

Figure 9-3 of the 2040 General Plan Background Report shows that the project site is not located in a landslide zone, and therefore the project would not cause on- or off-site landslides (City of Hayward 2014c). The project could potentially result in lateral spreading, subsidence, liquefaction, or collapse during major earthquake events; however, as analyzed in the General Plan EIR, compliance with General Plan Policies, the California Building Code, and associated seismic provisions for this region of California would reduce the impacts to less than significant. Additionally, the project site is in a generally flat area where landslides are unlikely and not in an area with high or very high liquefaction potential (City of Hayward 2014b). No impacts beyond those previously analyzed would occur.

d. Would the project be located on expansive soil, as defined in Table 1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

☑ ANALYZED IN THE PRIOR EIR

The General Plan EIR analyzes the potential for expansive soils to create risks to life and property and finds this impact to be less than significant with incorporation of General Plan policies to reduce impacts. According to a geotechnical report prepared for the project by Rockridge Geotechnical in November 2018 (Appendix E), the project site is on near-surface clay soils that have high to very high plasticity and expansion potential. The report recommends that the foundations and slabs underlying the proposed buildings should be designed for such a condition. Rockridge Geotechnical recommended that the project control for moisture content in the soils through moisture-conditioning the expansive soil, providing select, non-expansive fill or lime-treated soil below interior and exterior slabs, and either supporting foundations below the zone of severe moisture change or by providing a stiff, shallow foundation that can limit deformation of the structure as the underlying soils shrinks and swells. To prevent the soil subgrade beneath the building slab-on-grade from drying during construction and to reduce the long-term effects of expansive subgrade soil, a minimum of 18 inches of imported non-expansive fill should be placed on the prepared subgrade. Alternatively, the upper 18 inches of slab subgrade may be treated in place with lime to reduce its expansion potential. If a post-tensioned (P-T) slab-on-grade is used in lieu of footings, the P-T slab should be underlain by at least 18 inches of imported non-expansive fill or lime-treated on-site soil. After construction is completed, moisture content of soils could be controlled by a comprehensive surface drainage system that provides proposer control of all surface runoff. Finally, Rockridge Geotechnical notes that moisture could be further controlled by eliminating landscaping that requires heavy irrigation to prevent excess watering or ponding on the project site.

The project would be required to comply with the Uniform Building Code, the California Building Code, and applicable General Plan Policies, including Policy HAZ-2.1 and Policy HAZ-2.2, that feature requirements to evaluate geologic, seismic, and soil-related conditions and risks for new construction on sites in geologic hazard zones, and to design structures and buildings pursuant to applicable standards and codes. Per standard City project approval procedures, the City and Rockridge Geotechnical must review final project design plans conformity with building code requirements prior to project construction. All earthwork, including site grading, wall foundation excavations, placement and compaction of engineered fill, and final surface drainage installation, would be performed in accordance with the recommendations contained in the geotechnical report. Therefore, the project would have no impacts beyond those identified in previous environmental documents.

e. Would the project 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?

☑ NO IMPACT

The City's comprehensive, integrated wastewater collection, treatment, and disposal municipal sanitary sewer system would serve the project site. Implementation of the project would not involve the use of septic tanks or other alternative waste water disposal systems; therefore, the project would have no impact.

f. Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

☑ LESS THAN SIGNIFICANT

Rincon evaluated the paleontological sensitivity of the geologic units that underlie the project site using the results of the paleontological locality search and review of existing information in the scientific literature concerning known fossils within those geologic units. Rincon reviewed fossil collections records from the University of California Museum of Paleontology (UCMP) online database, which contains known fossil localities in Alameda County and reviewed geologic maps and scientific literature including Dibblee and Minch (2005) and Helley and Graymer (1997).

Following the literature review and museum record search a paleontological sensitivity classification was assigned to the geologic units within the project area. The potential for impacts to significant paleontological resources is based on the potential for ground disturbance to directly impact paleontologically sensitive geologic units. The Society of Vertebrate Paleontology (SVP) (2010) has developed a system for assessing paleontological sensitivity and describes sedimentary rock units as having high, low, undetermined, or no potential for containing scientifically significant nonrenewable paleontological resources. This criterion is based on rock units within which vertebrate or significant invertebrate fossils have been determined by previous studies to be present or likely to be present.

The project is located in the Coast Ranges geomorphic province of California, which extends about 600 miles from the Oregon border south to the Santa Ynez River in Santa Barbara County (CGS 2002; Norris and Webb 1990). The project site is mapped at a scale of 1:24,000 by Dibblee and Minch (2005) and is immediately underlain by Holocene alluvium (Qa). These younger Quaternary deposits are composed of alluvial gravel, sand, and clay of valley areas and gravel and sand of major stream channels (Dibblee and Minch 2005; Helley and Graymer 1997). These Holocene deposits are underlain by rocks of the Cretaceous Central Valley Sequence and older Pleistocene alluvium at moderate depth (approximately 10-20 feet below ground surface). Intact Holocene alluvial deposits in the project site are too young to preserve paleontological resources; however, at moderate depth, the Holocene sediments may grade downward into older deposits of Pleistocene age (Qoa) that could preserve fossil remains.

A search of the paleontological locality records maintained by UCMP's online database resulted in no previously recorded vertebrate fossil localities within Holocene sedimentary deposits in the project vicinity.

Consistent with SVP (2010) guidelines, Rincon determined the paleontological sensitivity of the project site based on a literature review and museum locality search. Holocene sedimentary deposits, particularly those younger than 5,000 years old, are generally too young to contain fossilized material. Therefore, the Holocene alluvial deposits mapped at the surface of the project site have been assigned a low paleontological sensitivity.

The Holocene alluvium mapped at ground surface in the project site are determined to have a low paleontological resource potential and they are likely too young to contain fossilized material. Project ground disturbance would be minimal as there are no proposed subterranean components associated with the project site. Given that the fossiliferous deposits may occur at greater depths than anticipated project disturbance, the potential for encountering fossil resources during project-related ground disturbance is low and impacts to paleontological resources are not anticipated. Additionally, Policy NR-7.2 of the General Plan addresses paleontological resource mitigation and requires that the City develop or ensure compliance with protocols that protect or mitigate impacts to paleontological resources, including requiring grading and construction projects to cease activity when a paleontological resource is discovered so it can be safely removed. Therefore, impacts would be less than significant and further paleontological resource management is not recommended.

Conclusion

The project would have no new significant or substantially more severe or peculiar impacts to geology and soil resources, nor are there any potentially significant off-site impacts, cumulative impacts, or previously identified significant effects, which were not discussed in the prior environmental documents. Also, there are no previously identified significant effects which, because of substantial new information that was not known at the time of the previous environmental review, are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

8 Greenhouse Gas Emissions

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project:					
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☐	■	☐
b. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	■	☐

Analysis in Previous Environmental Documents

The General Plan EIR analyzes Greenhous Gas Emissions (GHG) on pages 10-1 through 10-42 and concludes that impacts would be less than significant.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine if project-specific impacts would occur that are 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a. Would the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

b. Would the project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

☑ ANALYZED IN THE PRIOR EIR

The General Plan EIR includes a discussion of the City-adopted Climate Action Plan (CAP) of 2009 that brings the City into compliance with Senate Bill (SB) 375 and statewide GHG reduction goals. The CAP was adopted in response to state guidance and regional guidance on reducing GHG emissions (City of Hayward 2014b). As a part of the update process for the 2040 General Plan, the City re-evaluated the GHG reduction estimates assigned to individual actions in the 2009 CAP. This analysis resulted in the development of new and modified actions that were incorporated into the 2040 General Plan and its overall policy framework. This integrated approach allows the 2040 General Plan to be recognized as a “Plan for the Reduction of Greenhouse Gas Emissions” and as a

"Qualified Greenhouse Gas Reduction Strategy" by BAAQMD (City of Hayward 2014a). Although the CAP was adopted in 2009, it established targets using the Executive Order S-3-05 emissions trajectory and aligns with SB 32 and the 2017 Scoping Plan. The CAP included a 2005 emissions inventory that estimated the total GHG emissions in Hayward at approximately 1,183,279 metric tons (MT) of carbon dioxide equivalence (CO_2e) in 2005. Implementation of the CAP would result in a citywide emissions reduction target of 12.5 percent below 2005 levels by the year 2020 and 82.5 percent below 2005 levels by 2050 (City of Hayward 2014b). As stated in the General Plan EIR, forecasted GHG emissions for the City of Hayward in 2050 without mitigation is 1,670,080 MT of CO_2e. With implementation of the CAP, the projected emissions for 2050 would be 1,152,398 MT CO_2e, which results in an 82.5 percent reduction below the 2005 baseline and 87.6 percent below business as usual projections for 2050.

As concluded in the General Plan EIR, the proposed General Plan contains a comprehensive strategy that achieves a communitywide GHG emission reduction target of 12.5 percent below 2005 levels by the year 2020 and puts the City on course to achieve ongoing GHG emission reductions through the year 2050. Thus, the project would not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. Estimated GHG emissions per service population (residents plus employees) in 2020, 2040, and 2050 would be below the BAAQMD recommended threshold of 6.6 MT CO_2e per service population per year. Thus, the proposed project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment.

The proposed project would be consistent with the General Plan; therefore, implementation of the General Plan, including development of the proposed project, would not result in significant GHG emissions impacts. No impacts beyond those analyzed in the previous environmental documents would occur.

Conclusion

Based on the analysis of GHG in the General Plan EIR with which the project is consistent, no new impacts or circumstances would occur that would require additional review of the project. The project would have no new significant or substantially more severe or peculiar impacts to GHG, nor are there any potentially significant off-site impacts, cumulative impacts, or previously identified significant effects, which were not discussed in the prior environmental documents. Also, there are no previously identified significant effects which, because of substantial new information that was not known at the time of the previous environmental review, are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

9 Hazards and Hazardous Materials

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project:					
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	■	☐
b. 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?	☐	☐	☐	■	☐
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?	☐	■	☐	☐	☐
d. Be located on a site that is included on a list of hazardous material 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?	☐	■	☐	☐	☐
e. For a project located in 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 or excessive noise for people residing or working in the project area?	☐	☐	■	☐	☐

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
f. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	■	☐	☐	☐
g. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	☐	■	☐	☐	☐

Analysis in Previous Environmental Documents

The General Plan EIR discusses Hazards and Hazardous Materials impacts on pages 11-1 through 11-24 and finds that impacts related to hazards and hazardous materials use in the City would be less than significant.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine if project-specific impacts would occur that are 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a. Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

b. Would the project 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?

☑ ANALYZED IN THE PRIOR EIR

Residential and commercial uses, such as those proposed by the mixed-use project, typically do not use or store large quantities of hazardous materials. During grading and construction activities, limited quantities of miscellaneous hazardous substances, such as gasoline, diesel fuel, hydraulic fluid, solvents, oils, paints, may be transported to the site, used on site, and disposed over after use. However, the project would be required to comply with applicable federal, state, and local regulations that address the handling, storage, use, and disposal of hazardous substances, including the Occupational Safety and Health Act and the Toxic Substances Control Act. This would eliminate potential significant hazards to the public or the environment through the routine transport, use, or disposal of hazardous materials. Construction contractors would be required to comply with applicable federal and state environmental and workplace safety laws. Additionally, as discussed in Section 7, *Geology and Soils,* and Section 10, *Hydrology and Water Quality,* the project would be required to develop a SWPPP that must include BMPs to control accidental spills of equipment fluids and measures for cleanup. Adherence to these regulatory requirements and the SWPPP would ensure that this impact is less than significant.

c. *Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?*

☑ LESS THAN SIGNIFICANT

There is one school within 0.25 mile of the project site, Valle Vista School, located approximately 650 feet (0.12 mile) southeast of the project site. As described under criteria (a) and (b), construction activities may involve the use, storage, or transport of hazardous materials, such as gasoline, diesel fuel, hydraulic fluid, solvents, oils, and paints. However, the transport, use, storage, and disposal of hazardous materials associated with construction are subject to applicable federal, state, and local regulations to minimize the release of hazardous materials into the environment. As a mixed-use project with residential and commercial space, the proposed project would not emit substantial quantities of hazardous materials or hazardous waste. As discussed below under criterion (d), there is no evidence of soil or groundwater contamination on-site, and therefore release of contaminated soil during construction is not anticipated. The impact would be less than significant.

d. *Would the project be located on a site that is included on a list of hazardous material 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?*

☑ LESS THAN SIGNIFICANT

Pursuant to Government Code Section 65962.5, the following databases were queried on August 12, 2019 for known hazardous materials contamination in the project site.

- **United States Environmental Protection Agency**
  - Comprehensive Environmental Response, Compensation, and Liability Information System/ Superfund Enterprise Management System/Envirofacts database search
- **State Water Resources Control Board (SWRCB)**
  - GeoTracker search for leaking underground storage tanks and other cleanup sites
- **California Department of Toxic Substances Control**
  - EnviroStor search for hazardous facilities or known contamination sites
  - Cortese List of Hazardous Waste and Substances Sites
  - Cleanup Site and Hazardous Waste Facilities Database

The project site is not included on a list compiled pursuant to Section 65962.5 of the Government Code. A search of the GeoTracker database identified two leaking underground storage tanks (LUST) cleanup sites within 0.25 mile of the project site (76 Service Station No. 4199 at 29874 Mission Boulevard and Beacon #12546 at 29705 Mission Boulevard). The 76 Service Station site received regulatory closure in September 2011 and the Beacon site received regulatory closure in April 2018 (SWRCB 2011, 2018). The search also identified an open cleanup program site at the Former Holiday Bowl, 29705 Mission Boulevard, approximately 0.1 mile southeast of the project site. The site has been designated as undergoing remediation as of October 22, 2017 (SWRCB 2017). The site was found to have elevated concentrations of tetrachloroethylene (PCE) in the soil as well as impacts to soil and groundwater from petroleum products due to former operations as a gas station. According to a Phase I ESA conducted for the 29705 Mission Boulevard site in September of 2018, corrective actions have been undertaken to remediate the PCE impacted soil and a Response Plan, including a vapor intrusion mitigation system, was in progress, with a planned Soil Management Plan to be completed in the future (ENGEO 2018). Because of the distance of this site from the project site, potential contamination from this site would not affect the proposed project.

In March 2018, Partner Engineering and Science, Inc. conducted a Phase I Environmental Site Assessment for the project site (Partner Engineering and Science, Inc. 2018; Appendix F) and found no evidence of soil or groundwater contamination or hazardous materials release that would impact the project site. The project would not create a significant hazard to the public environment, and therefore the impact would be less than significant.

e. *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 or excessive noise for people residing or working in the project area?*

☑ NO IMPACT

The nearest airport to the project site is the Hayward Executive Airport, located approximately four miles to the northwest. The project site is not located within the Hayward Executive Airport Influence Area and is located outside the existing noise level contours for the airport (Alameda County Airport Land Use Commission [ALUC] 2012). Therefore, the project would not subject persons working at the site to safety hazards, and there would be no impact from potential air traffic safety risks.

f. *Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?*

☑ LESS THAN SIGNIFICANT

As stated in the General Plan EIR, the City must maintain its status as a Certified Unified Program Agency (CUPA) and implement a Comprehensive Emergency Management Plan to outline its responsibilities in emergencies and coordinate the response and recovery efforts of City departments, local energy providers, and federal, State, and local agencies. The project would not block access or permanently constrain evacuation routes adopted in an emergency response plan or emergency evaluation plan. With the required implementation of the Comprehensive Emergency Management Plan, impacts would be less than significant.

g. *Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?*

☑ LESS THAN SIGNIFICANT

The project site is in an urbanized area of Hayward, surrounded primarily by paved surfaces and structures. The project site is not intermixed with or adjacent to wildlands. Figure 5-3 of the 2040 General Plan Background Report indicates the project site is a low fire hazard risk (City of Hayward 2014c). Impacts would be less than significant.

Conclusion

The project would not involve development in areas not analyzed previously in the General Plan EIR and would have no new significant or substantially more severe or peculiar impacts regarding hazards and hazardous materials, nor are there any potentially significant off-site impacts, cumulative impacts, or previously identified significant effects, not discussed in the prior environmental documents. No previously identified significant effects exist that, as a result of substantial new information not known at the time of the previous environmental review, are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

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10 Hydrology and Water Quality

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project:					
a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	■	☐	☐	☐
b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☐	■	☐
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:					
(i) Result in substantial erosion or siltation on- or off-site;	☐	■	☐	☐	☐
(ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;	☐	■	☐	☐	☐
(iii) 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; or	☐	■	☐	☐	☐
(iv) Impede or redirect flood flows?	☐	■	☐	☐	☐

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	■	☐	■
e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	■	☐	☐	☐

Analysis in Previous Environmental Documents

The General Plan EIR discusses Hydrology and Water Quality impacts on pages 13-1 through 13-40. The EIR found that potential impacts to hydrology and water quality would be less than significant.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine if project-specific impacts would occur that are 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a. Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

e. Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

☑ LESS THAN SIGNIFICANT

The General Plan EIR concluded that with compliance with existing regulations, City of Hayward Standard Conditions of Approval, and General Plan policies, impacts related to water quality associated with General Plan implementation would be less than significant. The proposed project would modify the site conditions which could affect water quality during construction and operation. However, as explained in the following discussions, there are no project-specific impacts peculiar to the project and impacts related to the project would be less than significant.

Construction Impacts

During grading activities, the site’s soils would be exposed to wind and water erosion that could transport sediments into local stormwater drainages. Also, accidental spills of fluids or fuels from construction vehicles and equipment, or miscellaneous construction materials and debris, could be mobilized and transported off-site in overland flow. These contaminant sources could degrade the water quality of receiving water bodies (e.g., San Francisco Bay), potentially resulting in a violation of water quality standards.

As part of Section 402 of the Clean Water Act, the United States Environmental Protection Agency has established regulations under the National Pollution Discharge Elimination System (NPDES) program to control both construction and operation (occupancy) stormwater discharges. The federal Clean Water Act was first adopted in 1972 and is intended to protect and preserve water supply and quality in the "waters of the nation." In the Bay Area, the San Francisco Regional Water Quality Control Board (RWQCB) administers the NPDES permitting program and is responsible for developing permitting requirements. According to General Plan Policy NR-6.8 (NPDES Permit Compliance), the City shall continue to comply with the NPDES program. The project would be subject to the San Francisco Bay Region Municipal Regional Stormwater Permit (MRP), NPDES Permit Order No. R2-2015-0049, and the provisions set forth in Section C.3 *New Development and Redevelopment*. Under the conditions of the permitting program, the applicant would be required to eliminate or reduce non-stormwater discharges to waters of the nation, develop and implement a SWPPP for construction activities, and perform inspections of the stormwater pollution prevention measures and control practices to ensure conformance with the site SWPPP. Because the project would disturb at least one acre of land, the project must provide stormwater treatment and would be required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit Order 2009-0009-DWQ or 2009-0009-DWQ General Permit).

Furthermore, in accordance with HMC Chapter 10, Article 8 (Grading and Clearing), all grading activities must be conducted in a manner that would minimize the potential for erosion from the site. If requested by the City engineer, the project applicant would be required to prepare and implement an Erosion and Sediment Control Plan that specifies control techniques that would prevent erosion during construction. Therefore, with compliance with construction-related water quality and erosion control requirements, construction of the project would not violate any water quality standards, substantially alter the drainage pattern of the area such that substantial erosion or siltation would occur and would not degrade water quality. Impacts during construction would be less than significant.

Operational Impacts

The project would result in a substantial increase in the total area of impervious surfaces on the project site, from 2,047 square feet to 78,396 square feet. Increasing the total area of impervious surfaces can result in a greater potential to introduce pollutants to receiving waters. Urban runoff can carry a variety of pollutants, including oil and grease, metals, sediment, and pesticide residues from roadways, parking lots, rooftops, and landscaped areas depositing them into adjacent waterways via the storm drain system.

Stormwater discharge during operation is regulated by the Municipal Separate Storm Sewer System (MS4) Permit, issued by the RWQCB, pursuant to NPDES regulations. Water quality in stormwater runoff is regulated locally by the Alameda County Clean Water Program, which includes the C.3 provisions set by the San Francisco Bay RWQCB. Provision C.3 of the MRP addresses post-construction stormwater requirements for new development and redevelopment projects that add and/or replace 10,000 square feet or more of impervious area. Because the project would over 10,000 square feet of the impervious surface of the project site, it must comply with the C.3 provisions set by the RWQCB. Therefore, the project must meet certain criteria including 1) incorporate site design, source control, and stormwater treatment measures into the project design; 2) minimize the discharge of pollutants in stormwater runoff and non-stormwater discharge; and 3) minimize increases in runoff flows as compared to pre-development conditions. A Stormwater Control Plan (SCP) that details the site control, source control, and stormwater measures that would be implemented at the site must be submitted to the City. In addition, Low Impact Development (LID) requirements apply. The Alameda County Clean Water Program's C.3 Technical Guidance document (2016) provides guidance on how to meet the C.3 requirements.

Pursuant to C.3 requirements, the project is required to include design features that would reduce impacts associated with the increased impervious surfaces. As shown in the proposed site plans in Figure 4 through Figure 9, the project is designed to direct runoff from roofs and sidewalks into vegetated areas and would include five landscaped bioretention areas to treat runoff from the roof, parking lot, and interior courtyard before entering the stormwater system. By adhering to the provisions of NPDES Section C.3, the SWPPP, and the stormwater control plan, the project would not result in adverse effects on water quality and or in the violation of water quality standards or waste discharge requirements during construction or operation. Therefore, the project would have a less than significant impact on water quality. With implementation of the measures contained in these plans, excessive stormwater runoff, erosion, and sedimentation would not occur and the potential for the project to violate water quality standards and substantially degrade water quality would be reduced. Impacts would be less than significant.

b. Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

☑ ANALYZED IN THE PRIOR EIR

The General Plan EIR concluded that General Plan policies would ensure that future development would not deplete groundwater supplies substantially. As stated in the Hayward 2040 General Plan Background Report (City of Hayward 2014c), the City of Hayward stopped using groundwater to supply water to the city in 1963, except in cases of emergency. The project would not rely on groundwater to supply water to the site. Development under the project does not include installation of new groundwater wells or use of groundwater from existing wells. Although the project may increase impervious surfaces on the site, the project is consistent with the General Plan and applicable General Plan policies and would not use water or prevent recharge at a rate beyond that anticipated in the Plan. Therefore, the project would have no impacts beyond those previously identified in the prior environmental documents.

c.(i) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation on- or off-site?

c.(iii) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would 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?

☑ LESS THAN SIGNIFICANT

The most northeastern portion of Alameda Creek is approximately 0.25 mile southwest of the project site (measured from the drainage opening to the nearest corner of the site) and does not flow through or adjacent to the site. The segment of Alameda Creek nearest the project site is completely channelized and lined with concrete. The area surrounding the project site is developed, and project construction would not alter the course of a creek or other stream or river (no other surface water features are identified in the project area). Project runoff would maintain pre-project drainage patterns by connecting to existing storm drain facilities and would not be directed to the banks of a creek. No impacts to bank stability would occur.

As described above under criteria (a) and (e), the project would increase the site's impervious surface area by 97 percent, thereby increasing the potential for off-site runoff. This increased runoff could result in on- or off-site erosion or siltation. However, per the Alameda County Municipal Regional Stormwater Discharge Permit, the project would be required to implement Low Impact Development (LID) techniques to reduce the potential for on or offsite erosion or siltation.

Increased stormwater from the project site would enter the City's existing stormwater conveyance system. While the project would alter the existing drainage pattern of the site by increasing impervious surfaces, as noted in criteria (a) and (e) above, it would be required to comply with Provision C.3 of the MRP which requires new developments disturbing more than 10,000 square feet 1) incorporate site design, source control, and stormwater treatment measures into the project design; 2) minimize the discharge of pollutants in stormwater runoff and non-stormwater discharge; and 3) minimize increases in runoff flows as compared to pre-development conditions. Therefore, the proposed project would not create or contribute runoff that would exceed the capacity of the existing stormwater conveyance infrastructure or otherwise substantially alter the course of Alameda Creek. Impacts would be less than significant.

c.(ii) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

c.(iv) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would impede or redirect flood flows?

☑ LESS THAN SIGNIFICANT

The project site is not within a 100-year flood hazard area (1 percent chance annually); the project site is located within Zone X, defined as an area of minimal flood hazard (FEMA 2009). The project site is also outside of ABAG's mapped dam failure inundation area (ABAG 1995). Therefore, although the project would increase impervious surfaces, development would not substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site, or which would impede or redirect flood flows. This impact would be less than significant.

d. In flood hazard, tsunami, or seiche zones, would the project risk release of pollutants due to project inundation?

☑ NO IMPACT

The project site is not located in a tsunami inundation area, nor is there a water body near the project site capable of seiche. The nearest large body of water to the project is the San Francisco Bay, which is approximately two miles to the west of the project site. The site is also approximately five miles from Lake Chabot to the South West. Therefore, there would be no risk of risk of release of pollutants due to project inundation, and there would be no impact.

Conclusion

The project would have no new significant or substantially more severe or peculiar impacts related to hydrology and water quality, nor are there any potentially significant off-site impacts, cumulative impacts, or previously identified significant effects, which were not discussed in the prior environmental documents. Also, there are no previously identified significant effects which, as a result of substantial new information that was not known at the time of the previous environmental review, are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

11 Land Use and Planning

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project:					
a. Physically divide an established community?	☐	☐	■	☐	☐
b. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	■	☐	☐

Analysis in Previous Environmental Documents

The General Plan EIR addresses Land Use and Planning on pages 14-1 through 14-42. Impacts to land use and planning were determined to be less than significant in the document.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine whether there would be project-specific impacts that are either 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a. Would the project physically divide an established community?

☑ NO IMPACT

The project would be infill development on a vacant site surrounded by existing development, and would not result in new obstructions or divisions between established communities. The project would be generally limited to the subject parcels and adjacent pedestrian improvements, and no linear or other features that could impede access between or within neighborhoods are proposed. Thus, the project would have no impact.

b. Would the project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

☑ NO IMPACT

Please refer to *Consistency of the Project with Other Plans and Documents*. As stated therein and shown in Table 2, the project is generally consistent with the Hayward 2040 General Plan and the development standards of the South Hayward BART/Mission Boulevard Form Based Code. There would be no impact due to a conflict with land use plans, policies, or regulations.

Conclusion

The project would have no new significant or substantially more severe or peculiar impacts related to land use and planning, nor are there any potentially significant off-site impacts, cumulative impacts, or previously identified significant effects, which were not discussed in the prior environmental documents. Also, there are no previously identified significant effects which, as a result of substantial new information that was not known at the time of the previous environmental review, are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

12 Mineral Resources

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project:					
a. 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?	☐	☐	■	☐	☐
b. 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?	☐	☐	■	☐	☐

Analysis in Previous Environmental Documents

The General Plan EIR analyzes mineral resources, along with geology and soils on page 9-1 to 9-18 and finds that impacts would be less than significant.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine whether there would be project-specific impacts that are either 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a. *Would the project 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?*

b. *Would the project 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?*

☑ NO IMPACT

The project site is not zoned or designated for mining uses and no active mining operations are in the project site or vicinity. The only State-designated mineral resource "sector" of regional significance in Hayward is the La Vista Quarry. All operations at the site have been terminated, and the Surface Mining Permit for the La Vista Quarry issued by Alameda County expired in 2008. The project would not result in the loss of availability of a known mineral resource that would be of value to the residents of the state and the region, nor would it result in loss of a locally important mineral resource recovery site. The project site is a vacant infill site, abutting existing commercial and residential uses, and does not involve developing currently undeveloped land with the potential to contain valuable mineral resources. There would be no impact.

Conclusion

The project would have no new significant or substantially more severe or peculiar impacts to mineral resources, nor are there any potentially significant off-site impacts, cumulative impacts, or previously identified significant effects, which were not discussed in the prior environmental documents. Also, there are no previously identified significant effects which, as a result of substantial new information that was not known at the time of the previous environmental review, are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

13 Noise

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project result in:					
a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☐	■
b. Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	■	☐
c. For a project located within the vicinity of a private airstrip or 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 expose people residing or working in the project area to excessive noise levels?	☐	☐	■	☐	☐

Analysis in Previous Environmental Documents

The General Plan EIR analyzes Noise on pages 15-1 through 15-32. Impacts due to construction-related ground vibration, railroad generated noise, and noise generated by stationary sources were found to be less than significant. Impacts related to short-term and long-term construction-generated noise are found to be significant and unavoidable.

As discussed under Impact 15-1 of the General Plan EIR, the General Plan Goal HAZ-8 (minimize human exposure to excessive noise) and Policies HAZ-8.17 (Community Noise Control Ordinance), HAZ-8.20 (Construction Noise Study), and HAZ-8.21 (Construction and Maintenance Noise Limits) establish the overall goal and intentions of the City with regards to construction-related noise. Policy HAZ-8.17 refers to a community noise control ordinance for the purposes of regulating community noise levels. The City has adopted Section 4-1.03.4 of the Municipal Code (Construction and Alteration of Structures; Landscaping Activities), which states that individual devices/pieces of construction equipment are not to exceed 83 dB at a distance of 25 feet from the source and 86 dB at any point of the property plane Monday through Saturday from 7:00 AM to 7:00 PM and Sundays from 10:00 AM to 6:00 PM, “unless otherwise provided pursuant to a duly-issued permit or a condition of approval.” Thus, while the code establishes specific standards to reduce construction noise from typical construction activities, these standards may not apply to all development projects requiring discretionary approval.

As discussed under Impact 15-2 of the General Plan EIR, implementation of the policies included in the Hazards Element such as Policy HAZ-8.2 (Noise Study and Mitigation) and Policy HAZ-8.5 (Residential Noise Standards) require new projects to evaluate noise exposure and provide mitigation measures, if applicable, to reduce noise exposure at sensitive land uses and meet noise standards for the specific project type. Therefore, conducting project-level noise studies to comply with adopted noise standards would ensure that individuals are not exposed to excessive noise levels.

Although adoption of General Plan policies would require that new development comply with adopted noise standards and, therefore, would not expose new receivers to excessive noise levels, the General Plan would still result in increases in traffic-related noise (i.e., increases of 3 or more dB and up to 15 dB in some areas of the City). As a result, project-generated increases in noise would result in a substantial permanent increase in community noise levels that could adversely affect existing receivers.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine whether there would be project-specific impacts that are either 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a. *Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?*

☑ SUBSTANTIALLY MITIGATED BY UNIFORMLY APPLICABLE DEVELOPMENT POLICIES

Based on the noise studies conducted for the General Plan EIR, the segment of Mission Boulevard near the project site from Industrial Parkway West to Tennyson Road had a community noise equivalent level (CNEL) of 69.1 A-weighted decibels (dBA) at 50 feet during the 2010 baseline measurements, and is projected to have a CNEL of 71.8 dBA in 2040 under the General Plan buildout (City of Hayward 2014b). This is above the “normally acceptable” exterior noise level of 65 dBA for the multi-family residential land use type, as designated by the General Plan.

Two 15-minute noise measurements were taken at the project site on August 14, 2019, one along Mission Boulevard, and one at the rear of the property near the multi-family residences, using an ANSI Type II integrating sound level meter. As shown in Table 5, the existing ambient noise levels on the site range from approximately 53 dBA to 70 dBA equivalent sound level (L_{eq}). Full noise measurement results are provided in Appendix G.

Table 5 Noise Measurement Results

Site	Measurement Location	Sample Times	Approximate Distance to Primary Noise Source[1]	Leq[15] (dBA)[2]
1	Northeastern border of the project site along Mission Boulevard	11:55 a.m. – 12:10 p.m.	50 feet	70.1
2	Southwestern edge of the project site near multi-family residences	12:21 – 12:36 p.m.	300 feet	53.1

[1] Distance to centerline of Mission Boulevard

[2]The equivalent noise level (Leq) is defined as the single steady A-weighted level that is equivalent to the same amount of energy as that contained in the actual fluctuating levels over a period of time (essentially, the average noise level). For this measurement, the Leq was over a 15-minute period (Leq [15]).

Source: Rincon Consultants, field measurements conducted on August 14, 2019, using ANSI Type II Integrating sound level meter. See Appendix G.

The measurement taken at the project boundary along Mission Boulevard is above the City of Hayward's "normally acceptable" exterior noise level threshold for multi-family residences of 65 dBA.

To avoid adverse noise exposure, the project is required to attenuate interior noise so that it does not exceed 45 dBA Ldn. The California Building Code (CBC) requires that interior noise levels for habitable rooms be no greater than 45 dBA CNEL. In order to comply with CBC requirements, the project applicant is required to design the structure such that interior levels of 45 dBA CNEL are achieved. This requirement would be included as a condition of approval of the project to ensure compliance with the California Building Code. Therefore, the proposed project would not result in exposure of future users to noise levels in excess of standards established in the City's General Plan.

Operation of the project would generate the type of noise typical of residential and commercial development and would be consistent with nearby residential, commercial, and religious institutional land uses. Mechanical equipment on the project site and vehicle trips associated with the new building could increase noise levels. Noise associated with project operation would primarily result from new motor vehicle trips to and from the project site. As analyzed in Section 17, *Transportation*, the proposed project would not generate traffic volumes in excess of that assumed for the project site in the General Plan EIR, and therefore, traffic noise would be below levels assumed in for the General Plan buildout year of 2040. The General Plan EIR found that changes in traffic patterns may create a permanent increase in ambient noise levels, although it was found that the section of Mission Boulevard at the project site frontage would not experience a significant increase in noise levels. Additionally, General Plan Policies HAZ-8.2, HAZ-8.5, HAZ-8.17, and HAZ-8.23 provide actions aimed at reducing impacts from traffic noise, such as enforcing maximum acceptable interior and exterior noise levels for multi-family residences. Therefore, the project would not have an impact beyond that analyzed previously.

Project construction activities on-site and traffic noise from construction vehicles would increase noise levels in the project vicinity. Nearby noise-sensitive land uses, including the multi-family residences directly west of the project site, would be exposed to temporary construction noise during development of the project. Noise impacts are a function of the type of activity being undertaken and the distance to the receiver location. Table 6 estimates construction noise at a reference distance of 50 feet from the source equipment. (Although the multi-family residences are adjacent to the southwestern project boundary, reference noise levels for construction equipment cannot be adapted with precision to much closer distances.)

Table 6 Estimated Maximum Construction Noise

Equipment	Typical Noise Level (dBA) 50 ft from Source	Equipment	Typical Noise Level (dBA) 50 ft from Source
Air Compressor	80	Jack Hammer	88
Backhoe	80	Loader	80
Compactor	82	Paver	85
Ballast Equalizer	82	Pneumatic Tool	85
Ballast Tamper	83	Pump	77
Compactor	82	Rail Saw	90
Concrete Mixer	85	Roller	85
Concrete Pump	82	Saw	76
Concrete Vibrator	76	Scarifier	83
Crane, Derrick	88	Scraper	85
Crane, Mobile	83	Shovel	82
Dozer	85	Tie Cutter	84
Generator	82	Tie Handler	80
Grader	85	Tie Inserter	85
Impact Wrench	85	Truck	88

Source: Federal Transit Administration (FTA) 2018

As shown in Table 6, construction noise could reach as high as an estimated 90 dBA Leq at the nearest noise-sensitive receivers during construction. Such levels would exceed ambient noise and would be audible on adjacent properties, including residences immediately southwest of the project site. However, Section 4-1.03.4 of the Hayward Municipal Code limits the hours of construction and maintenance activities to the less sensitive hours of the day (7:00 a.m. – 7:00 p.m. Monday through Saturday and 10:00 a.m. – 6:00 p.m. on Sundays and holidays). Therefore, construction would not occur during recognized sleep hours. This section also states that construction activities shall not produce a noise level outside the property lines in excess of 86 dBA. The project site is located in an urban area where some construction noise is expected and the construction methods and equipment would be typical for residential construction in urban and suburban areas; for example, no pile driving, or major excavation would be required. Therefore, project construction would be within the range of typical construction noise for an urban area.

The City of Hayward's standard conditions of approval related to construction noise would reduce construction-related noise at nearby noise-sensitive receivers, in accordance with the levels required by Hayward Municipal Code 4-1.03-4. With implementation of the following standard condition of approval, construction noise would only occur within the hours specified in the Hayward Municipal Code. Furthermore, this would reduce overall noise levels from construction activity. The use of manufacturer-certified mufflers associated with construction equipment has been shown to reduce noise levels by 10 dBA L_{eq} or more with optimal systems (FHWA 2017). As shown above in Table 6, construction noise could be as high as approximately 90 dBA L_{eq} at surrounding residential receptors approximately 50 feet from construction activity. With the use of mufflers this noise would be reduced to 80 dBA L_{eq}, which would be below the standards included in the Hayward Municipal Code. Therefore, compliance with this uniformly applicable development policy would reduce impacts to a less than significant level.

Standard Condition of Approval

The following control measures for construction noise, grading and construction activities shall be adhered to, unless otherwise approved by the Planning Director or City Engineer:

- In conformance with Section 4-1.03-4 of the City's Municipal Code, construction activities between 7:00 a.m. and 7:00 p.m. Monday through Saturday or between 10:00 a.m. and 6:00 p.m. on Sundays or holidays, unless other construction hours are permitted by the City Engineer or Chief Building Official, shall not include any individual equipment that produces a noise level exceeding 83 dBA measured at 25 feet, nor shall activities produce a noise level outside the project property lines in excess of 86 dBA. During all other hours, noise shall not exceed the limits defined in Municipal Code Section 4-1.03.1 (70 dB daytime or 60 dB nighttime, measured at residential property lines).
- Grading and construction equipment shall be properly muffled;
- Unnecessary idling of grading and construction equipment is prohibited;
- Stationary noise-generating construction equipment, such as compressors, shall be located as far as practical from occupied residential housing units;
- Applicant/developer shall designate a "noise disturbance coordinator" who will be responsible for responding to any local complaints about construction noise.
- Letters shall be mailed to surrounding property owners and residents within 300 feet of the project boundary with this information.
- The developer shall post the property with signs that shall indicate the names and phone number of individuals who may be contacted, including those of staff at the BAAQMD, when occupants of adjacent residences find that construction is creating excessive dust or odors, or is otherwise objectionable. Letters shall also be mailed to surrounding property owners and residents with this information prior to commencement of construction.

b. Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

☑ ANALYZED IN THE PRIOR EIR

Construction of the project would intermittently generate vibration on and adjacent to the project site. Hayward General Plan Policy HAZ 8.22 requires each development project to assess vibration at the project level. The project would be a typical construction project as analyzed in the Hayward General Plan EIR. Vibration-generating equipment can include bulldozers and loaded trucks to move materials and debris, and caisson drills to install shoring. It is assumed that pile drivers, which generate strong groundborne vibration, would not be used during construction, as there would not be substantial below grade work for foundational support. The distance to the nearest sensitive receivers from the project site, the multi-family residences located adjacent to the southwest boundary, is estimated at 25 feet to be conservative. This measurement was taken from the project boundary to the nearest structure, as outdoor vibration is generally not perceptible and only interior vibration is considered in this analysis. Although the multi-family residences are adjacent to the site boundary, construction equipment would only operate intermittently for very short periods at the property lines. Table 7 identifies vibration velocity levels at a distance of 25 feet from the source.

Table 7 Vibration Levels for Construction Equipment at Noise-Sensitive Receptors

Equipment	Estimated VdB at 25 feet
Caisson drill	87
Large bulldozer	87
Loaded trucks	86
Small bulldozer	58

Source: FTA 2018

Based on Table 7, noise-sensitive receptors would experience the strongest vibration of up to 87 VdB during the use of caisson drills and grading activity with large bulldozers. Compliance with Section 4-1.03.4 of the Hayward Municipal Code would restrict vibration-generating construction activity to daytime hours that are outside of normal sleeping hours, i.e., 7:00 a.m. – 7:00 P.M. Monday through Saturday and 10:00 A.M. – 6:00 P.M. on Sundays and holidays. While vibration from construction activity could be perceptible at adjacent receivers during daytime hours, this timing restriction would ensure that vibration does not exceed the FTA's criterion of 72 Vdb during normal sleeping hours at residential uses (FTA 2018). Vibration levels also would not exceed 95 VdB at fragile historic buildings as no such buildings are located adjacent to the site. Furthermore, project construction would be typical of urban projects in Hayward as envisioned in the General Plan EIR analysis. Impacts would be less than significant and within the scope of the impacts discussed in the General Plan EIR.

c. *For a project located within the vicinity of a private airstrip or 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 expose people residing or working in the project area to excessive noise levels?*

☑ NO IMPACT

As discussed in Section 9, *Hazards and Hazardous Materials*, the nearest airport to the project site is the Hayward Executive Airport, located approximately four miles northwest. The project site is not located within the Hayward Executive Airport Influence Area and is located outside the existing nose level contours for the airport (ALUC 2012). The project would not subject construction workers or residents at the site to excessive noise and no impact would occur.

Conclusion

With the City of Hayward's standard conditions of approval incorporated, the project would not have peculiar or substantial noise impacts, nor are there any potentially significant off-site impacts, cumulative impacts, or previously identified significant effects, which were not discussed in the prior environmental documents. Also, there are no previously identified significant effects which, as a result of substantial new information that was not known at the time of the previous environmental review, are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

14 Population and Housing

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project:					
a. Induce substantial unplanned population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?	☐	☐	☐	■	☐
b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	■	☐	■	☐	☐

Analysis in Previous Environmental Documents

The General Plan EIR discusses Population and Housing on pages 16-1 through 16-7. The General Plan EIR accounts for a population of 265,962 people at full buildout of the Hayward Planning Area and finds that impacts would be less than significant.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine whether there would be project-specific impacts that are either 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a. *Would the project induce substantial unplanned 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)?*

☑ ANALYZED IN THE PRIOR EIR

The project would replace an undeveloped lot with 140 new multi-family residential units on an infill site, consistent with the goals of the General Plan regarding efficient urban growth. Therefore, the project would directly generate population growth. Based on the City of Hayward's average household size of 3.12 persons per household, the project would add an estimated 437 new residents to the city (City of Hayward 2014c). The project would increase the population of Hayward from 159,433 to 159,870, an increase that falls within the residential buildout analyzed in the

General Plan EIR of 265,962 by the year 2040 (California Department of Finance 2019). Accordingly, it would not induce substantial population growth directly or indirectly because the project would be part of planned growth in the region and within the growth projection analyzed in the General Plan EIR. Population growth related to the project would not be more than that analyzed in previous environmental documents.

b. Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

☑ NO IMPACT

There are no existing structures or dwellings on the project site, and no housing would be demolished. The project would construct an additional 140 residential units. Therefore, construction and development of the site would not displace people or residences. The project would have no impact related to displacement of housing or people.

Conclusion

The project would not involve development in areas not analyzed previously in the General Plan EIR, nor would it result in impacts to population and housing not covered in the General Plan EIR. The project would have no new significant or substantially more severe or peculiar impacts concerning population and housing, nor are there any potentially significant off-site impacts, cumulative impacts, or previously identified significant effects, which were not discussed in the prior environmental documents. Also, there are no previously identified significant effects which, as a result of substantial new information that was not known at the time of the previous environmental review, are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

15 Public Services

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
a. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, 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 public services:					
1 Fire protection?	☐	☐	☐	■	☐
2 Police protection?	☐	☐	☐	■	☐
3 Schools?	☐	☐	☐	■	☐
4 Parks?	☐	■	☐	☐	☐
5 Other public facilities?	☐	☐	☐	■	☐

Analysis in Previous Environmental Documents

The General Plan EIR analyzes public services on pages 17-1 through 17-42 and concludes that impacts regarding public services would be less than significant.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine whether there would be project-specific impacts that are either 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a.1. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered fire protection facilities, or the need for new or physically altered fire protection facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives?

a.2. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered police protection facilities, or the need for new or physically altered police protection facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives?

☑ ANALYZED IN THE PRIOR EIR

The General Plan EIR evaluates fire and police protection demand impacts and finds them to be less than significant with implementation of applicable General Plan policies, including required enforcement of fire and building codes, and implementation of defensible space and "Crime Prevention Through Environmental Design" concepts. The project involves infill development as envisioned in the General Plan, in an area currently served by police and fire protection services; therefore, it would result in no impacts beyond those previously identified in the prior environmental documents.

a.3. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered schools, or the need for new or physically altered schools, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios or other performance objectives?

☑ ANALYZED IN THE PRIOR EIR

While new development, including the proposed project, would increase the demand for new school facilities, the General Plan EIR analyzes this issue and finds impacts to be less than significant with implementation of General Plan policies. Hayward Unified School District (HUSD) provides public school services in Hayward. The school district has experienced a substantial decline in its student population, which is expected to continue. While the General Plan Area covers an area that is served by other public school districts, the project site is located within an area served solely by HUSD (2019). Additionally, the project applicant would be required to pay development impact fees that would be used by the local school district to mitigate impact associated with long-term operation and maintenance of school facilities. Pursuant to Section 65996(3)(h) of the California Government Code, payment of these fees "is deemed to be full and complete mitigation of impacts of any legislative or adjudicative act, or both, involving but not limited to, the planning, use, or development of real property, or any change in government organization or reorganization." The project would therefore have a less than significant impact that would not be greater than that analyzed in the previous environmental documents.

a.4. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered parks, or the need for new or physically altered parks, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios or other performance objectives?

☑ LESS THAN SIGNIFICANT

Please refer to Section 16, *Recreation*.

a.5. Would the project result in substantial adverse physical impacts associated with the provision of other new or physically altered public facilities, or the need for other new or physically altered public facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives?

☑ ANALYZED IN THE PRIOR EIR

The proposed project does not include and would not require new or physically altered governmental facilities. Population growth facilitated by the proposed residential units included in the project would generate additional demand for library services, but as discussed in Section 14, *Population and Housing*, the General Plan accounts for this population growth, and it is consistent with population growth forecasts in the General Plan. Impacts of the project would not be greater than those analyzed previously.

Conclusion

The project would have no new significant or substantially more severe or peculiar impacts to public services, nor are there potentially significant off-site impacts, cumulative impacts, or previously identified significant effects that not discussed in the prior environmental documents. Further, there are no previously identified significant effects which as a result of substantial new information not known at the time of the previous environmental review have been determined to have a more severe adverse impact than those discussed in the previous environmental documents. Accordingly, no additional review is required.

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16 Recreation

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
a. Would the project 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?	☐	■	☐	☐	☐
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	■	☐	☐

Analysis in Previous Environmental Documents

The General Plan EIR analyzes recreation on pages 17-1 through 17-42, in the Public Services section, and identifies a less than significant impact to recreation.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine whether there would be project-specific impacts that are either 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a. Would the project 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

The project includes residential development that would increase population in the Mission-Garin neighborhood in Hayward. The additional population would increase the use of existing parks and other recreational facilities. There are four existing parks within the one mile of the project site: Stony Brook Park, located approximately 0.2 mile to the east, Twin Bridges Park, located approximately 0.4 mile to the south, Tennyson Park, located approximately 0.9 mile to the west, and Bechtel Park, located approximately 0.8 mile northwest of the project site. Another 4,794 acres of regionally managed passive recreation area and open space is available in the Garin/Dry Creek Pioneer Regional Parks, located approximately 0.7 mile northeast of the project site. Additionally, two nearby parks, the La Vista Park and SoHay Park, are currently under construction and would add to the park space available in the area.

As described in the *Project Description* and shown in Table 1, the project includes on-site amenities including private and shared outdoor gathering spaces, raised community planters, movie wall and lawn, and a tot lot playground, which would lessen the need for off-site park space, as some amenities would be provided on-site as part of the project. Moreover, as described in the *Project Description* above, the project would be consistent with the maximum density allowed in the S-T5: Urban Center zoning district and thus the proposed density would be within the expected additional population analyzed in the General Plan EIR. The project applicant would be required to pay a development related mandatory park in-lieu fee that would be used to cover the cost of new facilities and maintenance of existing facilities pursuant to Chapter 10, Article XX of the HMC (Property Developers – Obligations for Parks and Recreation). This in lieu fee would ensure adequate parks and recreational facilities would be maintained with the proposed increase in population. Therefore, the increased use resulting from the project would not lead to a substantial physical deterioration of existing parks and recreational facilities. Impacts would be less than significant.

b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

☑ NO IMPACT

The project does not include recreational facilities and, as discussed under criterion (a), the project would not require the construction or expansion of existing recreational facilities. There would be no impact.

Conclusion

Impacts of the project would be similar to those identified in the General Plan EIR and would be less than significant. The project would have no new significant or substantially more severe or peculiar impacts concerning recreational resources, nor are there any potentially significant off-site impacts, cumulative impacts, or previously identified significant effects, which were not discussed in the prior environmental documents. Also, there are no previously identified significant effects which, as a result of substantial new information that was not known at the time of the previous environmental review, are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

17 Transportation

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project:					
a. Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☐	☐	■
b. Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☐	■	☐	☐
c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)?	☐	☐	☐	■	☐
d. Result in inadequate emergency access?	■	☐	☐	■	☐

Analysis in Previous Environmental Documents

The General Plan EIR evaluates Transportation impacts on pages 18-1 through 18-44. According to the EIR, impacts to traffic volumes as a result of General Plan implementation would result in an exceedance of the City standard for intersection performance and would potentially constitute a “considerable” contribution to the significant cumulative impact at City intersections. The General Plan EIR proposed several mitigation measures to improve the various intersections operating at a substandard level-of-service (LOS), although these intersections do not include those affected by the project. Impacts to Metropolitan Transportation System (MTS) and Congestion Management Program (CMP) roadways are found to be less than significant. Impacts relating to increased pedestrian activity and facilities, bicycle use and facilities, transit ridership and service are found to be less than significant. Additionally, impacts relating to air traffic patterns, transportation network design feature hazards, and emergency access are found to be less than significant.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine whether there would be project-specific impacts that are either 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a. *Would the project conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?*

☑ SUBSTANTIALLY MITIGATED BY UNIFORMLY APPLICABLE DEVELOPMENT POLICIES

Kittelson & Associates, Inc. prepared a Transportation Impact Analysis (TIA) to present the findings and conclusions of traffic impact analysis conducted for the proposed project in September 2019. The TIA evaluated seven study intersections near the project site for level of service (LOS) impacts. As noted in criteria (b) below, the City has not yet adopted vehicle miles traveled (VMT) impact criteria per SB 743 legislation, which has set a 2020 deadline for adoption. Therefore, the TIA used level of service criteria consistent with the City of Hayward's current practice.

The analysis estimated the number of new trips generated by the project at 131 additional trips during the AM peak hour and 99 trips during the PM peak hour. These trips were distributed to surrounding roadways based on the existing traffic volumes and were adjusted to match travel patterns from/to proposed project driveway locations. According to the City of Hayward guidelines for preparing traffic studies, the traffic generated by the proposed project would result in no impacts at the seven study intersections under the Existing Plus Project conditions analysis. As shown in the TIA (Appendix H), all study intersections would continue to operate at acceptable LOS.

The TIA also evaluated the Cumulative 2035 Plus Project delays and LOS for the study intersections, which accounts for project generated traffic in addition to cumulative traffic related to future development throughout the region. The City of Hayward Traffic Study Guidelines state that an intersection results in a significant impact, if:

> The intersection operates at Level of Service F without the project under Existing, Background or Cumulative conditions, and the addition of the project under Existing plus Project, Project or Cumulative plus Project conditions results in an increase in the average control delay of 5.0 seconds or greater when compared to the associated no project condition.

As shown in Table 11 of the TIA, the only study intersection with a significant impact due to reduced LOS is the Mission Boulevard and Industrial Parkway intersection. Under Cumulative conditions, the Mission Boulevard and Industrial Parkway intersection is forecast to operate to operate at LOS F with 133.2 seconds of delay during the AM Peak. With the addition of project traffic under Cumulative Plus Project conditions, the intersection is forecast to operate at LOS F with an average delay of 138.7 seconds, an increase of 5.5 seconds. This is greater than the City of Hayward 5.0 second increase threshold with respect to the intersection under Cumulative no-project conditions. However, this is considered an existing cumulative deficiency identified in the General Plan and is therefore not considered a project impact.

General Plan Policy M-4.4 (Systems Management) states that "The City shall encourage alternatives to road construction and expansion (e.g., adaptive signals and coordinated signals) as necessary for improving traffic flows." The intersection delays could be reduced back to the average delay of no-project conditions by optimizing the intersection's signal timing. Signal optimization would reduce the average delay after the addition of project traffic to 130.6 seconds, which is below the average delay in Cumulative No-Project conditions, and therefore below the 5.0 second increase threshold. The signal timing optimization would adjust the timing for each phase but does not modify the cycle length or coordination between signals. This would occur either as part of the traffic signal's adaptive control system, or as part of periodic signal timing done by the City to be addressed as part of the project's conditions of approval.

The General Plan EIR includes LOS analysis to evaluate traffic as a result of growth made possible by policies in the General Plan update. It was anticipated that traffic volumes along local streets would increase by 2035 and affect several roadway segments. This is consistent with the TIA's finding that buildout of the project site would result in a condition change that would exceed a threshold of significance for LOS. The General Plan includes policies and programs to reduce vehicle trips on the local roadways and encourage the use of alternative modes of transportation. Additionally, incorporation of the following standard condition of approval would ensure that LOS at the Mission Boulevard/Industrial Parkway intersection would be maintained and consistency with General Plan Policy M-4.4. With compliance with this uniformly applicable development policy, impacts to the circulation system would be less than significant.

Additionally, Figure 1-2 and Figure 1-3 of the FBC indicate the location of a new thoroughfare to be created along the rear of the project site referenced as Plan ST-56-34-BR. The plan detail calls for the construction of a 56-foot wide street with two-way vehicular traffic, on-street parking, planting strips and sidewalks on each side of the street - across the width of the project site. However, the project applicant has requested that the thoroughfare requirement to be waived. The General Plan EIR did not contemplate this thoroughfare, so the impacts of not building it would not be significant, nor a change from the existing conditions baseline. Furthermore, if built, the thoroughfare would start and end at dead-end, or lead into the new SoHay Park, which is not programmed for automobile circulation. Therefore, this impact would be less than significant.

The project also includes sidewalk improvements, which would improve the pedestrian circulation network, as well as bicycle parking facilities. Additionally, the project is located approximately 0.5 mile from the South Hayward BART station, and thus is a transit-oriented development. Appendix H contains additional information on the existing setting for pedestrian, bicycle, and transit facilities. The project would have a less than significant impact on these facilities.

Standard Condition of Approval

- Consistent with Policy M-4.4 of the City's General Plan, the project applicant shall pay the City their fair share contribution future modifications to the intersection signal timing to reduce the delay from additional project traffic in the cumulative plus project conditions scenario. The contribution amount for this intersection will be determined by the Public Works Director and shall be paid to the City prior to issuance of grading permit, or building permit, whichever comes first.

b. Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

☑ NO IMPACT

CEQA Guidelines Section 15064.3(b) identifies criteria for evaluating transportation impacts. Section 15064.3(c) states that the requirement to use these criteria only applies on and after July 1, 2020. Although a lead agency may elect to apply the criteria in Section 15064.3(b) sooner, the City of Hayward has not adopted these criteria as of the date of this Initial Study. Therefore, this section does not apply to the proposed project or the analysis in this Initial Study.

c. Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)?

☑ ANALYZED IN THE PRIOR EIR

The private driveway access that would form a U-shape surrounding the proposed apartment complex and would provide internal parking access and circulation for the site (shown in Figure 4 is the only new roadway planned for the project site. This resident access road would not create new hazards due to a design feature and the project would not involve uses that generate use of incompatible vehicles such as farm equipment. The City's traffic engineer would review project driveways and internal circulation to ensure design for safe operation. Chapter 10, Article 4 of the Hayward Municipal Code includes specific site planning and project design standards intended to address such issues as street design with reference to public safety and compatible use. Additionally, the project includes a requested concession to deviate from the maximum side setback in order to accommodate truck access and adequate vehicular circulation. Therefore, impacts would not be greater than those analyzed in previous environmental documents.

d. Would the project result in inadequate emergency access?

☑ ANALYZED IN THE PRIOR EIR

The Hayward Precise Plan Lines for Streets (Chapter 10, Article 4 of the Hayward Municipal Code) includes site-specific planning and project design standards intended to address such issues as emergency access. As stated in the General Plan EIR, projects under the General Plan buildout are required to comply with zoning requirements and the Hayward Municipal Code. In addition, the Hayward Police Department and Hayward Fire Department review individual development proposals to ensure that emergency access needs are met. The proposed project does not include modifications to existing city streets adjacent to the project site. Additionally, compliance with Section 10-4.01 of the Hayward Municipal Code would ensure accessibility to the project site is maintained. The proposed project would not impair implementation of an emergency plan or physically interfere with an emergency access, nor would it result in the blockage of access routes or evacuation routes adopted within an emergency response plan or emergency evaluation plan. As mentioned above under criterion (c), the project includes a requested concession to deviate from the maximum side setback in order to accommodate truck access and adequate vehicular circulation. Therefore, the project would have no impacts beyond those previously analyzed and identified in the prior environmental documents.

Conclusion

With City of Hayward standard conditions of approval incorporated, the project would not have peculiar impacts concerning transportation and traffic, nor are there any potentially significant off-site impacts, cumulative impacts, or previously identified significant effects, which were not discussed in the prior environmental documents. Also, there are no previously identified significant effects which, as a result of substantial new information that was not known at the time of the previous environmental review, are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

18 Tribal Cultural Resources

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in a Public Resources Code Section 21074 as either a site, feature, place, or 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:					
a. 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	☐	☐	☐	■	■
b. 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 resource to a California Native American tribe.	☐	☐	☐	■	■

As of July 1, 2015, California Assembly Bill 52 of 2014 (AB 52) was enacted and expands CEQA by defining a new resource category, "tribal cultural resources." AB 52 establishes 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" (PRC Section 21084.2). It further states that the lead agency shall establish measures to avoid impacts that would alter the significant characteristics of a tribal cultural resource, when feasible (PRC Section 21084.3).

PRC Section 21074 (a)(1)(A) and (B) defines tribal cultural resources as "sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe" and is:

1. 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
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 subdivision (c) of Public Resources

> Code Section 5024.1. In applying these criteria, the lead agency shall consider the significance of the resource to a California Native American tribe.

AB 52 also establishes a formal consultation process for California tribes regarding those resources. The consultation process must be completed before a CEQA document can be certified. Under AB 52, lead agencies are required to "begin consultation with a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project." Native American tribes to be included in the process are those that have requested notice of projects proposed within the jurisdiction of the lead agency.

a. Would the project cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code Section 21074 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)?

b. Would the project cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code 21074 that is 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?

☑ SUBSTANTIALLY MITIGATED BY UNIFORMLY APPLICABLE DEVELOPMENT POLICIES

The City of Hayward mailed a notification letter on August 5, 2019 to one local Native American tribe that has requested notification under AB 52, the Ione Band of Miwok Indians. Correspondence is included in Appendix B. Under AB 52, tribes have 30 days from receipt of the letter to respond and request consultation. The tribe did not respond during that window and request formal consultation under AB 52. Although no tribal cultural resources are expected to be present on-site, there is the possibility of encountering undisturbed subsurface tribal cultural resources. The proposed excavation of the project site could potentially result in adverse effects on unanticipated tribal cultural resources. However, impacts from the unanticipated discovery of tribal cultural resources during construction would be less than significant with adherence to City of Hayward Standard Conditions of Approval.

Standard Condition of Approval

> In the event that cultural resources of Native American origin are identified during construction, all earth disturbing work within the vicinity of the find must be temporarily suspended or redirected until an archaeologist has evaluated the nature and significance of the find and an appropriate Native American representative, based on the nature of the find, is consulted. If the City determines that the resource is a tribal cultural resource and thus significant under CEQA, a mitigation plan shall be prepared and implemented in accordance with state guidelines and in consultation with Native American groups. The plan would include avoidance of the resource or, if avoidance of the resource is infeasible, the plan would outline the appropriate treatment of the resource in coordination with the archeologist and the appropriate Native American tribal representative.

Conclusion

The project would have no new significant or substantially more severe or peculiar impacts to tribal cultural resources, nor are there potentially significant off-site impacts, cumulative impacts, or previously identified significant effects that not discussed in the prior environmental documents.

Furthermore, there are no previously identified significant effects which as a result of substantial new information not known at the time of the previous environmental review have been determined to have a more severe adverse impact than those discussed in the previous environmental documents. Accordingly, no additional review is required.

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19 Utilities and Service Systems

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Would the project:					
a. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☐	■	☐
b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☐	■	☐
c. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	■	☐
d. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☐	■	☐
e. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	■	☐

Analysis in Previous Environmental Documents

The General Plan EIR analyzes impacts on Utilities and Service Systems on pages 19-1 through 19-34. This discussion addresses the issues of water supply and delivery, wastewater collection and treatment, and solid waste disposal, recycling, and composting. The General Plan EIR identifies impacts to all utilities and service systems as less than significant.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine whether there would be project-specific impacts that are either 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a. *Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?*

c. *Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?*

☑ ANALYZED IN THE PRIOR EIR

The project would connect to the City of Hayward Sanitary District sanitary sewer system. Sanitary sewage from the City's system is treated at the Hayward Water Pollution Control Facility (WPCF). The treatment facility discharges into the San Francisco Bay under a permit with the RWQCB. Since the WPCF is considered a publicly-owned treatment facility, operational discharge flows treated at the WPCF would be required to comply with applicable water discharge requirements issued by the RWQCB. Compliance with conditions or permit requirements established by the City as well as water discharge requirements outlined by the RWQCB would ensure that wastewater discharges coming from the project site are treated by the WPCF system would not exceed applicable RWQCB wastewater treatment requirements.

The proposed project would increase population density incrementally in the City of Hayward. However, as described in Section 14, *Population and Housing*, population growth facilitated by the proposed residential units would be consistent with General Plan population growth forecasts. The project is consistent with the General Plan's Sustainable Mixed-Use land use designation and would not generate growth beyond that anticipated in the General Plan. The General Plan EIR found that there would be adequate capacity at the WPCF to serve development under the General Plan. Therefore, there is adequate capacity at the WPCF to service the project and no expansion of the WPCF would be required (City of Hayward 2014b).

The General Plan EIR states that General Plan buildout is not anticipated to require significant upgrades to water supply infrastructure. Additionally, the General Plan EIR states that implementation of General Plan would not require or result in the construction of new water or wastewater treatment facilities whose construction would cause significant environmental effects. Projects under the General Plan would not result in an increase of capacity of the City's wastewater treatment system, which is anticipated to have capacity to serve development under the 2040 General Plan in addition to its existing commitments. No impacts beyond those analyzed in the General Plan EIR would occur because of the project.

As discussed in Section 10, *Hydrology and Water Quality*, the project would involve development and grading over the whole 2.21-acre site. Therefore, the project would comply with Provision C.3 of the Municipal Regional Stormwater NPDES Permit, which applies to redevelopment projects that create and/or replace at least 10,000 square feet of impervious surfaces. Adherence to the C.3 requirements minimizes water quality impacts from new development to maintain regional compliance with the Municipal Regional Permit. Provision C.3 includes a LID provision (C.3.c) requires that low-impact development techniques be utilized to employ appropriate source control, site design, and stormwater treatment measures to prevent increases in runoff flows from new development projects. Additionally, the project would have internal stormwater drainage features and mechanical water quality improvement facilities, and new drainage areas would be appropriately sized and connected to the existing drainage system near the site (Refer to Section 10, *Hydrology and Water Quality*, and the description of the project earlier in this document for additional discussion).

As stated in the General Plan, development projects must comply with the requirement to maintain stormwater flows at pre-construction levels, per Provision C.3 of the Municipal Regional Stormwater NPDES permit. The General Plan EIR concludes that new development consistent with this policy would not require or result in the construction of new stormwater drainage facilities of expansion of existing facilities whose construction would cause significant environmental effects. As the project would be consistent with the General Plan and would be required to adhere to Provision C.3 of the Municipal Regional Stormwater NPDES Permit, it would result in no new or more severe impacts beyond those identified in the prior environmental review documents.

b. Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

☑ ANALYZED IN THE PRIOR EIR

The City of Hayward owns and operates its own water distribution system and purchases all of its water from the San Francisco Public Utilities Commission (SFPUC). In the case of emergency or disruption of water delivery from the SFPUC, water supplies are available through the Alameda County Water District and East Bay Municipal Utility District. With new development in the city, the General Plan EIR finds that water demand would increase from 19,537 acre-feet per year (AFY) in 2010 to 37,390 AFY year by 2035 (City of Hayward 2014c). The City is on target to meet future water demands during a normal precipitation year, accounting for future growth. The General Plan contains policies and programs to ensure water demand projections and development occurring under the General Plan would be accommodated. Additional population facilitated by new residential units constructed under the project are included in and consistent with the population growth forecasts of the General Plan. Therefore, water demand resulting from implementation of the proposed project was evaluated in the prior environmental review documents and it is not anticipated that SFPUC would need new or expanded entitlements or facilities to serve the project. With implementation of General Plan policies, sufficient water supplies would be available for the project demand, and the project would not result in impacts beyond those identified in the prior environmental review documents.

d. *Would the project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?*

☑ ANALYZED IN THE PRIOR EIR

Solid waste from the project site would be disposed of at the Altamont Landfill. In 2001, Altamont Landfill received County approval to increase capacity to allow the closure date to be extended to 2040. According to the General Plan EIR, the City's solid waste capacity is sufficient to meet the needs of projected growth until 2040 (City of Hayward 2014b). The General Plan also finds that impacts would be less than significant, as projected population growth under the General Plan is not anticipated to generate significant additional solid waste demand, and the General Plan contains policies to reduce solid waste impacts. Furthermore, the Hayward Municipal Code includes development standards relating to solid waste, recycling, and green waste materials storage. Projects under the General Plan buildout would comply with federal, state, and local statutes and regulations related to solid waste. The project would have no impacts beyond those analyzed previously.

Conclusion

Impacts of the project would be similar to those identified in the General Plan EIR and would be less than significant. The project would have no new significant or substantially more severe or peculiar impacts, nor are there any potentially significant off-site impacts, cumulative impacts, or previously identified significant effects, which were not discussed in the prior environmental documents. Also, there are no previously identified significant effects which because of substantial new information that was not known at the time of the previous environmental review, are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

20 Wildfire

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:					
a. Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	■	☐	☐
b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	■	☐	☐
c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	■	☐	☐
d. Expose people or structures to significant risks, including downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	■	☐	☐

Analysis in Previous Environmental Documents

The General Plan EIR discusses Wildfire impacts in the Hazards and Hazardous Materials section on pages 11-8 through 11-24 and finds that impacts related to wildfire in the City would be less than significant.

The following summarizes applicable analysis in the General Plan EIR and provides a review to determine if project-specific impacts would occur that are 1) peculiar to the project or the parcel on which the project is located; 2) were not previously analyzed in a previous environmental documents as significant effects; 3) are potentially significant off-site impacts and cumulative impacts that were not previously discussed in the previous environmental documents; and 4) are now determined to have a more severe impact than discussed in the previous environmental documents due to substantial new information.

Project-Specific Impacts

a. *If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project substantially impair an adopted emergency response plan or emergency evacuation plan?*

b. *If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project, due to slope, prevailing winds, and other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?*

c. *If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?*

d. *If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project expose people or structures to significant risks, including downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?*

☑ NO IMPACT

The project is located on the west side of Mission Boulevard outside of the City of Hayward Hillside Design Guidelines and Urban/Wildland Interface area. The project site is not located within or near a Very High Fire Hazard Severity Zone or state responsibility area. The nearest Very High Fire Hazard Severity Zone is located approximately one mile east of the project site (CalFire 2007; 2008). Because the site is not within or near a state responsibility area or a Very High Fire Hazard Severity Zone, no impacts related to wildfires would occur.

Conclusion

The project would not involve development in areas not analyzed previously in the General Plan EIR and would have no new significant or substantially more severe or peculiar impacts regarding wildfire, nor are there any potentially significant off-site impacts, cumulative impacts, or previously identified significant effects, not discussed in the prior environmental documents. No previously identified significant effects exist that, as a result of substantial new information not known at the time of the previous environmental review, are determined to have a more severe adverse impact that discussed in the previous environmental documents. Accordingly, no additional review is required.

21 Mandatory Findings of Significance

	Significant Impact	Less than Significant	No Impact	Analyzed in the Prior EIR	Substantially Mitigated by Uniformly Applicable Development Policies
Does the project:					
a. Have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☐	■
b. Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a 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)?	☐	☐	☐	■	☐
c. Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☐	■

Project-Specific Impacts

a. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

☑ SUBSTANTIALLY MITIGATED BY UNIFORMLY APPLICABLE DEVELOPMENT POLICIES

Consistent with the findings of the General Plan EIR and as discussed in Section 4, *Biological Resources*, with implementation of the City of Hayward's standard conditions of approval, the project would not substantially reduce the habitat of a fish or wildlife species; cause a fish or wildlife species population to drop below self-sustaining levels; threaten to eliminate a plant or animal community; or reduce the number or restrict the range of a rare or endangered plant or animal.

As discussed in Section 5, *Cultural Resources*, and in Section 7, *Geology and Soils*, with implementation of the City of Hayward's standard conditions of approval, the project would not eliminate important examples of the major periods of California history or prehistory, including archaeological or paleontological resources. As such, the project would not result in impacts peculiar to the project beyond those identified in the General Plan EIR and subsequent environmental documents.

b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a 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)?

☑ ANALYZED IN THE PRIOR EIR

Conformance with General Plan policies and City of Hayward standard conditions of approval specified in this document would ensure that potential impacts are individually limited and not cumulatively considerable in the context of impacts associated with other pending and planned development projects. As part of the General Plan EIR, cumulative impacts associated with buildout of infill projects were analyzed. The project is consistent with the General Plan EIR, and other existing and allowable land uses near the project are not significantly different than those studied in the cumulative analysis of the General Plan EIR. The General Plan is a document that establishes a land use scenario and goals, policies, and objectives for development and growth throughout the city, through the year 2040. Thus, the impact analyses in the General Plan EIR effectively constitute cumulative analyses of the approved land uses in the planning boundaries. The project would not result in significant impacts peculiar to the project site, as indicated in Sections 1 through 20 above. Nearby development would be required to be consistent with the local planning documents or mitigation would be required to assess the impacts that were not addressed in the General Plan EIR. Therefore, the project's consistency with the General Plan and subsequent analysis above in Sections 1 through 20 indicate that the project would not result in significant cumulative impacts that were not addressed in the General Plan EIR.

c. *Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?*

☑ SUBSTANTIALLY MITIGATED BY UNIFORMLY APPLICABLE DEVELOPMENT POLICIES

In general, impacts to human beings are associated with air quality, hazards and hazardous materials, geology and soils, noise, and traffic safety. As detailed in the preceding sections, the project would not result, either directly or indirectly, in substantial adverse impacts related to these issue areas. The project's effects on regional air quality, transportation, and geology and soils would be less than significant or were analyzed under prior environmental review. As discussed in Section 9, *Hazards and Hazardous Materials*, on-site construction and operations would not expose residents or customers to known hazardous materials. The generation of noise and vibration from construction activity, as discussed in Section 13, *Noise*, would be reduced to a level that is less than significant by the implementation of the City of Hayward's standard condition of approval listed therein. Therefore, the project would not have substantial direct or indirect adverse effects on human beings.

Conclusion

The proposed Hayward Mission Apartments project is consistent with the development density established by existing zoning and General Plan policies for which an EIR was certified. Accordingly, based on the assessments presented the environmental checklist, the project does not require additional environmental review as the impacts:

1. Are not peculiar to the project or the parcel on which the project would be located
2. Were analyzed as significant effects in a prior EIR on the zoning action, general plan, and specific plan, with which the project is consistent where applicable
3. Are not potentially significant off-site impacts and cumulative impacts which were not discussed in the prior EIR prepared for the general plan and specific plan
4. Are not previously identified significant effects which, as a result of substantial new information which was not known at the time the EIR was certified, are determined to have a more severe adverse impact than discussed in the prior EIR

The majority of impacts would be less than significant or were analyzed previously in the General Plan EIR. Additional impacts would be reduced or mitigated by the imposition of uniformly applied development policies or standards. Accordingly, implementation of the project complies with Section 15183 of the CEQA Guidelines and no further environmental review is required.

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Rincon Consultants, Inc. prepared this Environmental Consistency Checklist pursuant to CEQA Guidelines Section 15183 under contract to the City of Hayward. Persons involved in data gathering analysis, project management, and quality control include:

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Appendix A

Arborist Report

Attachment V

ARBORIST REPORT

29497, 29547, 29553
MISSION BOULEVARD

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March 14, 2019

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EXHIBITS

A	PHOTOS
B	SITE MAP WITH TREE LOCATIONS
C	TREE INVENTORY

Introduction & Assignment

Gates + Associates has retained me as their project arborist to complete a tree survey for a vacant lot in Hayward, California. The property is located at 29497, 29547, and 29553 Mission Boulevard. Plans for development have not been reviewed, but further information regarding trees can be addressed as the project progresses.

This report details my onsite observations, tree survey, appraisals, preliminary tree preservation guidelines, photos, and a site map with tree locations.

Survey Methods

On 2/23/19, I completed a ground level, visual inspection of all trees over 4" in trunk diameter at 4.5' above natural grade within the project site and neighboring trees in close proximity. I did not include several small volunteers.

- **Assessment**: A ground level, visual inspection of eighteen (18) trees was completed. Neighboring trees adjacent to property lines were included, but visual assessment was sometimes limited due to access. See Exhibit C for the detailed inventory.
- **Tagging**: I marked all trees included in the survey with a pre-numbered round, aluminum identification tag. I attached most tags to a main stem approximately 6' above grade, or lower if access was limited. Neighboring trees were not tagged, but were given a number for reference to this report, inventory, and map.
- **Mapping**: I used a handheld Garmin GPS (Global Positioning System) to plot tree locations and uploaded the waypoints with their associated tag numbers to an aerial Google Earth file. See Exhibit B for a screen shot of the tree location map. This data is intended to assist with tree location and is not intended to be of survey precision as GPS capabilities are limited. Accuracy may vary as a result of weather, canopy cover, or other obstructions.
- **Tree Name**: I identified the common and scientific names for all trees by genus and species, or by genus only if the species was not distinct.
- **Regulation Delineation**: I categorized trees as Protected or Non-protected in relation to their diameter and the City of Hayward Tree Ordinance. However, trees with smaller diameters may still be protected under pre-existing landscape plans.
- **DBH (Diameter at Breast Height)**: I measured tree trunk diameters rounded to the nearest half inch at 4.5' above natural grade. Trunk diameter measurement locations sometimes varied depending on tree structural character. If scaffold limbs were present at 4.5', I took the measurement just below that point to get a better representation of the trunk. If a tree had multiple stems, I combined diameters. In some cases, I estimated due to inaccessibility or other limitations.

- **Height**: I estimated tree height ranges in feet.
- **Canopy Spread**: I estimated the distance of the canopy radius in feet for all four directions.
- **Relative Age**: I estimated tree age as young, semi-mature, mature, or over-mature.
- **Health**: Where visible, I evaluated foliage health, foliage color, root collars, trunks, tree crowns, and tree vigor to calculate tree health on a 1-5 scale where 1 is very poor to dead and 5 is excellent. *Rating descriptions may include, but are not limited to the following examples:

Health Rating	***Examples**
5 - Excellent	Very healthy and vigorous, excellent foliage color, dense canopy, few visible indications of pests
4 - Good	Good vigor, good foliage color, mostly dense canopy, minor twig dieback or small deadwood, minor pest damage
3 - Fair	Moderate vigor, slightly thin canopy, fair or typical leaf color, some epicormic shoots, small deadwood or dieback, moderate pest damage
2 - Poor	In decline with poor vigor, dieback of medium to large branches, sparse/thin canopy, poor leaf color, pest damage, sometimes requiring extensive maintenance, continued monitoring, further assessment, or tree removal
1 - Very Poor or Dead	Severe decline, dead or mostly dead tree. Dieback of significant components of tree, very sparse or absent canopy, severe pest damage, requires tree removal

- **Structure**: Where visible, I evaluated tree architecture and form to calculate tree structure on a 1-5 scale where 1 is very poor and 5 is excellent. *Rating descriptions may include, but are not limited to the following examples:

Structure Rating	***Examples**
5 - Excellent	Excellent overall structure/architecture, balanced canopy, good trunk flare/taper
4 - Good	Good structure/architecture, mostly balanced canopy, minor structural features that are not ideal but may be tolerated or mitigated relatively easily
3 - Fair	Some structural defects, but may be typical of the species, sometimes requiring maintenance
2 - Poor	Poor structure with significant defects, poor attachments, asymmetrical canopy or significant lean that doesn't correct itself, sometimes requiring extensive maintenance, continued monitoring, further assessment or tree removal
1 - Very Poor	Extensive and major defects, weakly structured, severe lean, requires tree removal

- **Overall Condition**: I determined overall tree condition based on a variety of factors and rated them on a qualitative scheme of dead, poor, fair, and good.
- **Suitability for Preservation**: I evaluated each tree’s suitability for preservation as low, moderate or high based long-term success - Not based on anticipated development.

Species Profile

Eighteen trees of eight (8) varying species were included in this survey. Nine (9) of the trees are located on the project site and nine (9) are located on neighboring sites.

Table 1: Species Profile

ONSITE TREES	
Tree Name	Tree Count
Fan palm *Washingtonia* spp.	3
Evergreen ash *Fraxinus uhdei*	2
Olive *Olea europaea*	2
Canary island date palm *Phoenix canariensis*	1
Prunus spp. *Prunus* spp.	1
TOTAL:	**9**

NEIGHBORING TREES	
Tree Name	Tree Count
Ornamental pear *Pyrus calleryana*	4
Evergreen ash *Fraxinus uhdei*	2
London plane *Platanus x hispanica*	1
Olive *Olea europaea*	1
Loquat *Eriobotrya* spp.	1
TOTAL:	**9**

Tree Condition Summary

Most of the trees included in this survey are semi-mature specimens in fair condition and structure.

Chart 1: Tree Condition

Tree Descriptions

Evergreen ash (Tree nos. 1,6,15,17) There are four (4) ash trees located on the northwestern property line; two (2) on the project site and two (2) on a neighboring site just over the same fence-line. They are all semi-mature to mature specimens with fairly poor structure and health. If the site is developed into a high traffic area, the removal of project site ash trees should be considered as they are not worthy of long-term preservation.

Ornamental pears (Tree nos. 11-14) There are four (4) pear trees located on a neighboring property to the northwest. The trees are between an existing building and the fence-line dividing the two properties. All four (4) trees are located partially beneath other tree canopies and have developed phototropic leans. Though all four (4) of the pears appear to be in fair condition, they have fairly poor structure with multiple scaffolds originating from one point and acute angles of attachments.

Fan palms (Tree nos. 4,5,7) There are three (3) young to mature fan palms located around the project site perimeter. All three trees are in good condition with only minor chlorosis and a few dead fronds.

Olives (Tree nos. 2,3,16) There are three (3) semi-mature, multi-stemmed olives located along the northwest fence-line; two (2) are on the project site and one (1) is on a neighboring site just over the same fence-line. All three (3) trees are in fair to good health, with good foliage color and size, but they have been lions-tailed, raised, and thinned. A few also have twisting stems with acute angles of attachments.

Canary island date palm (Tree no. 8) There is one (1) mature Canary island date palm located on the eastern side of the vacant lot, closer to the center of the property than the other perimeter trees. Other than having an old chain-link fence and rocks embedded in its lower trunk, the palm appears to be in good condition. There are no dead fronds present and the palm appears to have been recently pruned.

London plane (Tree no. 10) There is one (1) semi-mature London plane tree on a neighboring site to the north, located along Mission Blvd. Aside from the possible, consecutive Anthracnose and powdery mildew infections, the tree appears to be in good condition. The London plane is located in a lawn and has a root barrier circling close to its trunk. It has also been pruned on one side in the past – likely for building clearance.

Loquat (Tree no. 18) There is one (1) neighboring loquat tree in a residential backyard along the southwestern fence-line. Due to inaccessibility, I was not able to assess the structure of the tree, but the top of the canopy appeared healthy and in good condition.

Prunus spp. (Tree no. 9) There is one (1) partially dead, multi-stemmed prunus species along the southeast property line. It is in poor condition and has poor structure; likely a volunteer.

Regulated Trees

On commercial sites, trees 8” or greater in trunk diameter measured at 4.5’ above natural grade are defined as *Protected* by the City of Hayward Tree Ordinance Article 15 SEC. 10-15.13. Multi-trunked trees are also protected when the combined diameters of the largest three trunks are 8” or greater at 4.5’ above natural grade. Some variations of this regulation may apply to sites with pre-existing landscape plans. Please reference the City of Hayward Tree Ordinance and Planning Department for more detail.

All nine (9) trees on the project site are considered *Protected*.

Table 2: Protected Trees

Tag #	Tree Name	DBH (inches)
1	Evergreen ash *Fraxinus uhdei*	M - 14, 13, 10.5 = 37.5
2	Olive *Olea europaea*	M - 5.5, 4.5, 4, 3 = 17 (Largest three stems are over 8" combined)
3	Olive *Olea europaea*	M - 5, 4, 3.5 = 12.5
4	Fan palm *Washingtonia* spp.	12
5	Fan palm *Washingtonia* spp.	19
6	Evergreen ash *Fraxinus uhdei*	M - 12, 8 = 20
7	Fan palm *Washingtonia* spp.	19
8	Canary island date palm *Phoenix canariensis*	37
9	Prunus spp. *Prunus* spp.	12 stems - Avg. 2" = 24 (Largest three stems are over 8" combined)

Suitability for Preservation

Each tree onsite has been rated for its suitability for preservation, despite anticipated development. Many factors are considered to assign each tree with either a **high**, **moderate** or **low** suitability for preservation rating. Factors such as tree health, condition, age, planting location, species and structure are all considered to determine if each tree is suitable for the site and if it has a potential to perform well over the long-term.

Some trees may have good health and structure, but receive a low rating if they are planted in an area not suited to them. Trees in fairly poor condition may still receive a moderate rating if they are planted in an appropriate location and if they have the potential to improve with proper care. A high rating includes trees both in fair to good condition and suited to their current location. A low rating may be assigned to a tree in severe decline or that may outgrow its planter relatively soon.

Table 3: High - Healthy trees with good structure and a high potential to contribute long-term to the site.

Tag #	Tree Name
7	Fan palm *Washingtonia* spp.
8	Canary island date palm *Phoenix canariensis*

Table 4: Moderate - Trees with minor health and/or structural issues that may be improved or tolerated.

Tag #	Tree Name
2	Olive *Olea europaea*
3	Olive *Olea europaea*
5	Fan palm *Washingtonia* spp.

Table 5: Low - Poor structure, health, planting site and/or species selection. Significant structural and/or health issues that are difficult to mitigate and that may warrant removal.

Tag #	Tree Name
1	Evergreen ash *Fraxinus uhdei*
4	Fan palm *Washingtonia* spp.
6	Evergreen ash *Fraxinus uhdei*
9	Prunus spp. *Prunus* spp.

Table 6: Neighboring Trees - Neighboring trees were rated on their suitability for preservation, but their retention depends on the neighbor's preferences.

Tag #	Tree Name	Suitability for Preservation
10	London plane *Platanus x hispanica*	High
11	Ornamental pear *Pyrus calleryana*	Low
12	Ornamental pear *Pyrus calleryana*	Low
13	Ornamental pear *Pyrus calleryana*	Low
14	Ornamental pear *Pyrus calleryana*	Low
15	Evergreen ash *Fraxinus uhdei*	Moderate
16	Olive *Olea europaea*	Moderate
17	Evergreen ash *Fraxinus uhdei*	Low
18	Loquat *Eriobotrya* spp.	High

Mitigation

SEC. 10-15.20 of the City of Hayward Tree Ordinance defines mitigation for protected trees as follows:

> "All removed or disfigured trees shall also require replacement with like- size, like-kind trees or an equal value tree or trees as determined by the City's Landscape Architect. If a replacement tree is unavailable in like size or kind, the value of the original Protected Tree shall be determined using the latest edition of "Guide for Plant Appraisal" by the International Society of Arboriculture. The valuation shall be used to determine the number and size of replacement trees required. The replacement trees shall be located on site wherever possible. Where there is not sufficient room on site for the replacement trees in the judgment of the City Landscape Architect or his or her designated representative, another site may be designated that is mutually agreeable. These replacement trees shall not be counted as part of the required trees to meet zoning standards for the original site."

Calculations for mitigation replacement trees can be provided as the project progresses and after a plan set has been reviewed.

Appraisals

The *Guide for Plant Appraisal*, 9th edition (published in 2000 by the International Society of Arboriculture, Champaign, IL), the *Species Classification and Group Assignment* (published in 2004 by the Western Chapter of the International Society of Arboriculture).

Table 7: Tree Values

Tag #	Tree Name	DBH (inches)	Height (feet)	Appraised Value
1	Evergreen ash *Fraxinus uhdei*	M - 14, 13, 10.5 = 37.5	25-35	$2,100.00
2	Olive *Olea europaea*	M - 5.5, 4.5, 4, 3 = 17 (Largest three stems = 14)	15-20	$940.00
3	Olive *Olea europaea*	M - 5, 4, 3.5 = 12.5	15-20	$680.00
4	Fan palm *Washingtonia* spp.	12	10-15	**$250.00
5	Fan palm *Washingtonia* spp.	19	40-50	**$1,000.00
6	Evergreen ash *Fraxinus uhdei*	M - 12, 8 = 20	45-55	$430.00
7	Fan palm *Washingtonia* spp.	19	25-35	**$625.00
8	Canary island date palm *Phoenix canariensis*	37	25-35	**$9,375.00
9	Prunus spp. *Prunus* spp.	12 stems - Avg. 2" = 24 (Largest three stems = Approx. 9)	10-15	*$195.00

*Replacement trees available in like-size and like-kind: Approximate wholesale cost of a 24” box used.
**Approximate cost per linear trunk foot was used for palms.

Total Value**: $15,595.00**

General Tree Preservation Guidelines

Construction and development activities and impacts have the potential to seriously harm trees. Common injuries that occur during construction are root damage or loss during grading and trenching, soil compaction, trunk and branch impact injuries and/or heat and chemical damage.

Trees provide social, environmental and economic benefits, and thus are an asset worth protecting. The following guidelines should be followed to help protect retained trees throughout the construction process. Adjustments to these guidelines may be required if revisions to project plans are made.

1. **Tree Protection Zone**: A Tree Protection Zone (TPZ) is a defined area around a tree trunk intended to protect roots and soil to help ensure their future health and stability.

   The TPZ should be as large as possible with a radius at least ten times the trunk diameter. (e.g. 2' diameter tree = 20' radius from the perimeter of the trunk or 40' TPZ.)

   Contractor shall notify the project arborist a minimum of 24 hours in advance of any activity within the TPZ.

2. **Tree Fencing**: Fencing around the TPZ shall be installed prior to demolition or construction. Unless otherwise approved; fencing shall be used to protect the trees described as follows:

   A minimum of six-foot high chain link fencing shall be installed at the TPZ perimeters or beyond of all trees to be preserved. The fence shall be mounted on two-inch diameter steel posts and driven into the ground a minimum of two feet, on a minimum of ten-foot centers. Do not use portable footings.

   Fencing should remain in place until all construction is complete.

3. **Signage**: 8.5" x 11" TPZ Warning Signs shall be attached to the face of each fence.

4. **Restricted activities within TPZ's:** To prevent or minimize potential injury to designated trees during construction or development, certain activities are prohibited or restricted within the TPZ.

   Restricted activities include but are not limited to: Demolition, soil grading, trenching, storage of materials or debris, tool/equipment cleaning, dumping of chemicals, paint or concrete slurry, pedestrian traffic and parking of vehicles or equipment. Trees shall not be used for bracing, anchoring or winching.

5. **Mulching**: Exposed soil should be covered with a minimum of 4" of organic wood chip mulch spread throughout the TPZ under tree canopies.

6. **Irrigation:** Soil moisture should be monitored regularly to ensure it is moist to a depth of 18”. In the event irrigation is disrupted supplemental irrigation must be provided. Ten to fifteen gallons per inch of trunk diameter can be used as a rule of thumb, but must be monitored for adequacy by monitoring soil moisture with a probe or other device. Slow soil soaking throughout the entire TPZ every two to three weeks may be needed through dry weather and increased as needed during persistent hot and dry weather.

7. **Pruning:** Under the direction of the Project Arborist, personnel assigned to pruning must have a minimum qualification as a ISA Certified Tree Worker, Certified Arborist or under the direct supervision of an onsite Certified Arborist at all times. All pruning shall be performed in accordance with ANSI A300 standards.

   Prior to construction, trees that interfere with driveways and sidewalks should be pruned for clearances. This will minimize the potential for limb breakage and pruning by unskilled workers through the project. Pruning shall not be attempted by construction or contractor personnel but shall be performed according to current industry standards.

   Following construction, pruning of green tissue should be avoided on trees for at least two years unless recommended by an arborist. Pruning should be limited to deadwood removal, clearances and/or safety concerns.

8. **Root Pruning & Excavation:** The project arborist must be on site to monitor all trenching or excavation inside the TPZ. Excavation and root pruning should be completed by an ISA Certified Tree Worker. If roots over two inches in diameter are encountered outside the TPZ the project arborist must be notified so that recommendations for treatment can be made.

   Roots that are severed must be cut cleanly with a sharp tool (chainsaw, pruning saw, or loppers) covered and kept moist until the trench is backfilled. Root ends can be wrapped with untreated burlap and wetted to keep them moist. Avoid tearing or damaging the outer surface or bark of roots to be retained. Relocate excavations or tunnel beneath encountered roots over 1” in diameter when possible.

The following publications provide guidelines for tree preservation:

- American National Standards Institute, 2012. *Tree, Shrub and Woody Plant Management Standard Practices, Management of Trees & Shrubs During Site Planning, Site Development and Construction*, (ANSI A 300 – Part 5, 2012)
- Kelby Fite and E Thomas Smiley, 2008, Best Management Practices, *Managing Trees During Construction*, International Society of Arboriculture.
- Matheny, Nelda P.; Clark, James R.; 1998. *Trees and Development*, International Society of Arboriculture.

Inspections: Depending on development and City requirements, the Project Arborist may need to perform the following site inspections.

A. **Inspection of Protective Tree Fencing**: Project Arborist to verify that the protective tree fencing is in place prior to issuance of a demolition, grading, or building permit, unless otherwise approved.

B. **Pre-Construction Meeting**: Prior to commencement of construction, the applicant or contractor shall conduct a pre-construction meeting to discuss tree protection with the job site superintendent, grading equipment operators, and project manager.

C. **Inspection of Rough Grading**: If grading is necessary, the project arborist shall perform an inspection during the course of rough grading adjacent to the TPZ to ensure trees will not be injured by compaction, cut or fill, drainage and/or trenching. Also, if required, inspect aeration systems, tree wells, drains, and special paving. The contractor shall provide the project arborist with at least 48 hours of notice of such activity.

D. **Monthly Inspections**: The Project Arborist shall perform monthly inspections at minimum to monitor changing conditions and tree health.

E. **Special activity within the Tree Protection Zone**: Work within the TPZ requires the direct onsite supervision of the Project Arborist.

References

Matheny, Nelda P., James R. Clark. Trees and Development: A Technical Guide to Preservation of Trees During Land Development. International Society of Arboriculture: Champaign, IL, 1998.

Fite, Kelby, E. Thomas Smiley. Managing Trees During Construction – Best Management Practices. 2nd Ed. International Society of Arboriculture: Champaign, IL, 2016.

The Guide for Plant Appraisal, 9th edition (published in 2000 by the International Society of Arboriculture, Champaign, IL)

Species Classification and Group Assignment (published in 2004 by the Western Chapter of the International Society of Arboriculture)

Assumptions & Limiting Conditions

1) Unless expressed otherwise: Information contained in this report covers only those items that were examined and reflects the condition of those items at the time of the inspection; the inspection is limited to visual examination of accessible items without dissection, excavation, probing, or coring, unless specifically stated otherwise in this report. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the plants or property in question may not arise in the future.

2) This inspection is limited to a visual inspection of what can be seen from the ground. No guarantee or warranty regarding the conditions or safety of these trees; is expressed or implied beyond the day of the inspection. (See Arborist Disclosure Statement)

3) Any legal descriptions provided to the Consultant/Appraiser are assumed to be correct. Any titles and ownerships of any property are assumed to be good and marketable. No responsibility is assumed for matters legal in character. Any and all property is appraised or evaluated as though free and clear, under responsible ownership and competent management.

4) It is assumed that any property is not in violation of any applicable codes, ordinances, statutes, or other governmental regulations.

5) Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible; however, the Consultant can neither guarantee nor be responsible for the accuracy of information provided by others.

6) Loss or alteration of any part of this document invalidates the entire document.

7) Possession of this report or a copy thereof does not imply right of publication or use for any purpose by anyone other than the person to whom it is addressed without prior express written or verbal consent of the Consultant/Appraiser.

8) The Consultant/Appraiser shall not be required to give testimony or to attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services, as described in the fee schedule and contract of engagement.

9) Neither all, nor any part of the contents of this report, nor any copy thereof, shall be conveyed by anyone, including the client, to the public through advertising, public relations, news, sales or other media, without the prior expressed written or verbal consent of the Consultant/Appraiser particularly as to value conclusions, identity of the Consultant/Appraiser, or any reference to any professional society or institute of to any initialed designation conferred upon the Consultant/Appraiser as stated in his qualifications.

10) This report and the values expressed herein represent the opinion of the Consultant/Appraiser, and the Consultant/Appraiser's fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.

11) Sketches, graphs and photographs in this report, are intended as visual aids, and are not necessarily to scale and should not be construed as engineering or architectural reports or surveys.

Arborist Disclosure Statement

Arborist: Katie Krebs Date: March 19, 2019

Arborists are tree specialists who use their education, knowledge, training and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce the risk of living near trees. Clients may choose to accept or disregard the recommendations of the arborist, or to seek additional advice.

Arborists cannot detect every condition that could possibly lead to the structural failure of a tree. Trees are living organisms that fail in ways we do not fully understand. Conditions are often hidden within trees and below ground. Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise, remedial treatments, like medicine, cannot be guaranteed.

Treatment, pruning and removal of trees may involve considerations beyond the scope of the arborist's services such as property boundaries, property ownership, site lines, disputes between neighbors, and other issues. Arborists cannot take such considerations into account unless complete and accurate information is disclosed to the arborist. An arborist should then be expected to reasonably rely upon the completeness and accuracy of the information provided.

Trees can be managed, but they cannot be controlled. To live near trees is to accept some degree of risk. The only way to eliminate all risk associated with trees is to eliminate all trees.

Certificate of Performance

I, Katie Krebs, certify that:

I have personally inspected the trees and properties referred to in this report and have stated my findings accurately.

I have no current or prospective interest in the vegetation or property that is the subject of this report and have no personal interest or bias with respect to the parties involved.

That my analysis, opinions, conclusions, and this report were developed and prepared according to commonly accepted arboricultural practices. No one provided significant professional assistance to me, unless indicated in the report.

My compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party or upon the results of the assessment, the attainment of stipulated results, or the occurrence of any subsequent events.

I further certify that I am a member in good standing with the Western Chapter International Society of Arboriculture; I am an International Society of Arboriculture Certified Arborist and have my International Society of Arboriculture Tree Risk Assessment Qualification. I have been involved in the field of arboriculture for over ten years.

Signed: Katie K Date: *March 19, 2019*

Arborist Qualifications

Credentials:

- International Society of Arboriculture (ISA), Certified Arborist #WE-8731A
- International Society of Arboriculture (ISA) Tree Risk Assessment Qualified

Professional Affiliations:

- International Society of Arboriculture
- Western Chapter International Society of Arboriculture
- American Society of Consulting Arborists

Education and Background:

- Katie J. Krebs – Consulting Arborist Services, 2017 – Present
- Cleary Bros. Landscape – Arborist Account Manager, 2013-2016
- ValleyCrest – Arborist Associate Account Manager, 2010-2013
- New Image Landscape – Arborist – 2008-09
- City of Palo Alto Public Works Tree Department – Technical Specialist, 2008
- Graduate of ASCA Arboricultural Consulting Academy
- Mountain View Trees – Previous Board member, Secretary and Volunteer
- UC Davis – B.A. Nature & Culture with emphasis in Arboriculture, 2003-05
- Ten plus years of varied arboricultural experience

Attachment V

EXHIBIT A:

TREE #1

TREE #2

TREE #3

TREE #4

TREE #5

TREE #6

Attachment V


TREE #7


TREE #8


TREE #9


TREE #10


TREE #11


TREE #12


TREE #13


TREE #14


TREE #15


TREE #16


TREE #17


TREE #18

Attachment V

EXHIBIT B:

Tree Location Diagram: Vacant lot on Mission Blvd. Hayward, CA (Between Red Chili Thai & Local 304 Union Bldg.) - Not to scale; for illustration purposes only

🟢 = Tree on project site (Tag nos. 1-9)
🟠 = Tree on neighboring site (Tag nos. 10-18)

Attachment V

EXHIBIT C:

Tag #	Tree Name	DBH (inches)	Height (feet)	Canopy Spread (feet)	Age	Health (1-5)	Structure (1-5)	Overall Condition	Protected due to 8"+ DBH	Suitability for Preservation	Value	Comments
1	Evergreen ash *Fraxinus uhdei*	M - 14, 13, 10.5 = 37.5	25-35	N - 25 E - 35 S - 20 W - 17	Mature	3	2	Fair	✓	Low	$2,100.00	3 stems originate at base with inclusion. Buried trunk flare. Growing into fence. Lions-tailed. Wire around trunk.
2	Olive *Olea europaea*	M - 5.5, 4.5, 4, 3 = 17	15-20	N - 7 E - 8 S - 7 W - 7	Semi-mature	3	3	Fair	✓	Moderate	$940.00	4 stems. Buried trunk flare. Lions-tailed. Thin canopy. Lower trunk damage. On fence-line.
3	Olive *Olea europaea*	M - 5, 4, 3.5 = 12.5	15-20	N - 6 E - 11 S - 11 W - 8	Semi-mature	3	3	Fair	✓	Moderate	$680.00	DBH below stems = 12" & 6". Stems removed previously. Lions-tailed. Thin canopy. On fence-line.
4	Fan palm *Washingtonia* spp.	12	10-15	N - 6 E - 6 S - 6 W - 4	Young	4	4	Good	✓	Low	**$250.00	Completes with small volunteer and neighboring tree. Likely a volunteer itself. On fence-line. Slight chlorosis.
5	Fan palm *Washingtonia* spp.	19	40-50	N - 8 E - 8 S - 8 W - 8	Mature	4	4	Good	✓	Moderate	**$1,000.00	On fence-line. Some dead fronds. Slight chlorosis. Good structure, but will compete with fence.
6	Evergreen ash *Fraxinus uhdei*	M - 12, 8 = 20	45-55	N - 15 E - 16 S - 12 W - 13	Mature	2	2	Poor	✓	Low	$430.00	Covered in ivy. DBH estimated. Growing into fence. Trunk flare covered. Very thin canopy.
7	Fan palm *Washingtonia* spp.	19	25-35	N - 6 E - 6 S - 6 W - 6	Mature	4	4	Good	✓	High	**$625.00	Slight slope/undercut on back side of trunk. Slight chlorosis. Near utility pole - make sure to maintain clearance and remove dead fronds if retained.
8	Canary island date palm *Phoenix canariensis*	37	25-35	N - 12 E - 12 S - 12 W - 12	Mature	4	4	Good	✓	High	**$9,375.00	Old chain-link fence and rocks embedded in lower trunk. No dead fronds. Appears to have been recently pruned.
9	Prunus spp. *Prunus* spp.	12 stems - Avrg. 2" = 24	10-15	N - 8 E - 7 S - 4 W - 7	Semi-mature	2	1	Poor	✓	Low	*$195.00	Approx. 12 stems with an average of 2" diameter each. On fence-line/wall bordering Red Chili restaurant. Many small beetle exit holes on trunks. Partially dead. Very poor structure.

Attachment V

Tag #	Tree Name	DBH (inches)	Height (feet)	Canopy Spread (feet)	Age	Health (1-5)	Structure (1-5)	Overall Condition	Protected due to 8"+ DBH	Suitability for Preservation	Value	Comments
10	London plane *Platanus x hispanica*	11	20-30	N - 11 E - 12 S - 10 W - 10	Semi-mature	4	4	Good	✓	High	NA	Neighboring tree - no tag. Root barrier around trunk. In lawn. Previously pruned for building clearance. Anthracnose.
11	Ornamental pear *Pyrus calleryana*	5.5	15-20	N - 8 E - 6 S - 3 W - 6	Young	3	3	Fair		Low	NA	Neighboring tree - no tag. DBH estimated.
12	Ornamental pear *Pyrus calleryana*	3.5	10-15	N - 4 E - 2 S - 2 W - 4	Young	3	2	Fair		Low	NA	Neighboring tree - no tag. Under ash and pear - competition. Topped estimated.
13	Ornamental pear *Pyrus calleryana*	5.5	15-20	N - 3 E - 8 S - 11 W - 6	Semi-mature	3	3	Fair		Low	NA	Neighboring tree - no tag. Leans away from ash tree. DBH estimated.
14	Ornamental pear *Pyrus calleryana*	6.5	15-20	N - 2 E - 9 S - 15 W - 6	Semi-mature	3	3	Fair		Low	NA	Neighboring tree - no tag. Leans away from tree no. 13. Bark inclusions. DBH estimated.
15	Evergreen ash *Fraxinus uhdei*	22	35-45	N - 16 E - 17 S - 14 W - 11	Mature	2	3	Fair	✓	Moderate	NA	Neighboring tree - no tag. Bark inclusions. Previously topped. DBH estimated below attachments. Very thin canopy. Lions-tailed.
16	Olive *Olea europaea*	M - 6.5, 3 = 9.5	15-20	N - 8 E - 6 S - 8 W - 7	Semi-mature	4	3	Fair	✓	Moderate	NA	Neighboring tree - no tag. Twisting stems. Lions-tailed. DBH estimated.
17	Evergreen ash *Fraxinus uhdei*	M - 7, 6.5 = 13.5	25-35	N - 12 E - 10 S - 6 W - 10	Semi-mature	2	2	Poor		Low	NA	Neighboring tree - no tag. Very thin canopy. Twisting stems. Covered in ivy. Growing in fence-line. DBH estimated.
18	Loquat *Eriobotrya* spp.	NA	10-15	N - 6 E - 6 S - 6 W - 6	Semi-mature	NA	NA	Good	NA	High	NA	Neighboring tree - no tag. No access to view lower portions of tree - Appears healthy, but couldn't assess structure. Listed condition as good, but this is an estimate based on upper canopy appearance only. Behind line of blackberries. DBH estimated.

*Replacement trees available in like-size and like-kind: Approximate wholesale cost of a 24” box used.

**Approximate cost per linear trunk foot was used for palms.

CONSULTING ARBORIST SERVICES

ADDENDUM NO. 1

Katie J. Krebs
ISA Certified Arborist #WE-8731A
ISA Tree Risk Assessment Qualified
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August 29, 2019

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2671 Crow Canyon Road
San Ramon, CA 94583

RE: Addendum No. 1 to Arborist Report dated 3/14/19
SITE: 29497, 29547, 29553 Mission Blvd. (Vacant Lot)

Mr. Gellerman,

This addendum is in response to your request for an appraisal of additional trees related to the development of a vacant lot located at 29497, 29547, and 29553 Mission Blvd. This addendum supplements my original report (dated 3/14/19), which should be reviewed in tandem.

The original arborist report included appraisal values for onsite trees only. This addendum lists values for trees located on neighboring properties, directly adjacent to the project site.

The *Guide for Plant Appraisal*, 9th edition (published in 2000 by the International Society of Arboriculture, Champaign, IL) and the *Species Classification and Group Assignment* (published in 2004 by the Western Chapter of the International Society of Arboriculture) were utilized to calculate the following values:

Table 1: Tree Values

Tag #	Tree Name	DBH (inches)	Value
10	London plane *Platanus x hispanica*	11	$1,230.00
11	Ornamental pear *Pyrus calleryana*	5.5	*$195.00
12	Ornamental pear *Pyrus calleryana*	3.5	*$195.00
13	Ornamental pear *Pyrus calleryana*	5.5	*$195.00
14	Ornamental pear *Pyrus calleryana*	6.5	$220.00
15	Evergreen ash *Fraxinus uhdei*	22	$1,130.00

16	Olive *Olea europaea*	M - 6.5, 3 = 9.5	$670.00
17	Evergreen ash *Fraxinus uhdei*	M - 7, 6.5 = 13.5	$310.00
18	Loquat *Eriobotrya* spp.	NA	**$475.00

*Approximate wholesale cost of a 24" box used.
**Approximate wholesale cost of a 36" box used.

Please feel free to contact me if you have any questions.

Thank you,

Katie J. Krebs
ISA Certified Arborist #WE-8731A
ISA Tree Risk Assessment Qualified
650.575.3200

Appendix B

AB 52 Correspondence

Attachment V

August 5, 2019

Sara D. Setshwaelo, Chairwoman
Ione Band of Miwok Indians
9252 Bush Street
P.O. Box 699
Plymouth, CA 95669

SUBJECT: **ASSEMBLY BILL 52 CONSULTATION NOTIFICATION**
For Hayward Mission Family Apartments
Located at 29497, 29547, and 29553 Mission Boulevard;
APN: 078C-0438-013-06, 078C-0438-014, and 078C-0438-015-02
City of Hayward, Alameda County, California

Dear Chairwoman Setshwaelo,

The City of Hayward ("City"), proposes the Hayward Mission Family Apartments, located at the above-referenced site(s), City of Hayward, Alameda County, California (Figures 1 and 2). Because the project qualifies as a "project" under the California Environmental Quality Act (CEQA) and Assembly Bill 52 (AB 52), the Lead Agency must consult with tribal groups about potential disturbance to cultural resources that may be of concern to those groups. The purpose of the consultation is to identify and consider potential impacts to a new category of resources called Tribal Cultural Resources (TCRs[1]) and take into account tribal cultural values (in addition to scientific and archaeological values) when identifying possible impacts and mitigation. An impact to a TCR may result in a significant impact under CEQA and require mitigation.

PROJECT DESCRIPTION

The project site is approximately 2.21 acres in size and consists of three assessor parcels (# 078C-0438-013-06, 078C-0438-014, and 078C-0438-015-02) located at 29497, 29547, and 29553 Mission Boulevard - approximately 0.5 miles from the South Hayward BART station.

The project site is undeveloped and is bordered by Mission Boulevard to the northeast, commercial uses to the southeast and northwest, and residential units to the west. The project site is zoned Urban Center Zone (S-T5) and has a General Plan land use designation of Sustainable Mixed Use (SMU) with a density range from 4.3-100 dwelling units per net acre.

Development Services Department
Planning Division T: 510.583.4200 TTD: 510.247.3340
777 B Street, Hayward, CA 94541 F: 510.583.3649 www.hayward-ca.gov
HAYWARD

Attachment V

The proposed project involves a Site Plan Review (SPR) and Density Bonus application to construct a mixed-use, five-story affordable housing development with 140 rental units, a 2,700-square-foot day care center, and 1,800 square feet of retail space. The project applicant is requesting to use two density bonus concessions consistent with State law. One for a deviation from the building disposition (setback) requirements and one for the removal of the required new thoroughfare with a 56-foot right-of-way that runs along the rear of the project site.

CONSULTATION OPPORTUNITY

The City would like to provide you with an opportunity to communicate concerns you might have regarding places within the project site that may be important to your community. The City requests your participation in the identification and protection of TCRs, sacred lands, or other heritage sites within the above described project site with the understanding that you or other members of the community might possess specialized knowledge of the area. AB 52 provides for a 30-day response window if you would like to consult with the City on this project. If you do not respond within 30 days, consultation under AB 52 is no longer required.

If you have any questions or concerns regarding this project, please feel free to contact me at (510) 583-4236 or via email at marcus.martinez@hayward-ca.gov.

Sincerely,

Marcus Martinez
Associate Planner

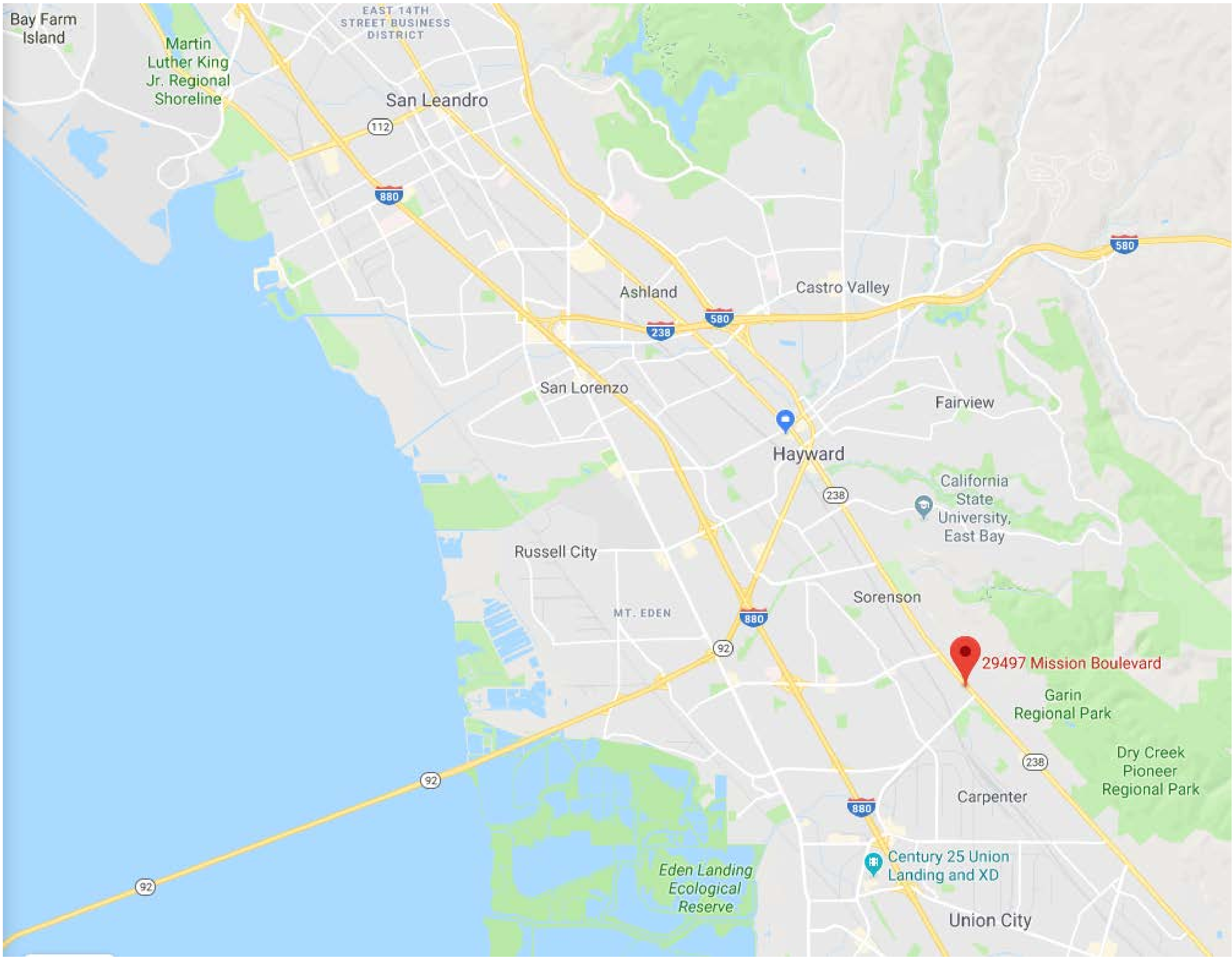
Attachments: Figure 1: Regional Location and Project Site
Figure 2: Project Site

---

[1] Public Resources Code (PRC) Section 21074(a) defines Tribal Cultural Resources as either of the following:

- Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either: (1) included or determined to be eligible for inclusion in the
- California Register of Historical Resources; or (2) included in a local register of historical resources as defined in subdivision (k) of PRC Section 5020.1; 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 PRC Section 5024.1.

FIGURE 1 – REGIONAL LOCATION AND PROJECT SITE



Source: Google Maps (Accessed August 5, 2019)

FIGURE 2 – PROJECT SITE

Appendix C

Roadway-Adjacent Health Risk Assessment

Attachment V

Roadway-Adjacent Health Risk Assessment

Performed at:

South Hayward BART/Mission Boulevard Project
29497, 29505, 29547 & 29553 Mission Boulevard
Hayward, California 94544

Prepared for:
META HOUSING CORPORATION
11150 West Olympic Boulevard, Suite 620
Los Angeles, California 90064

EFI Global Project No.:

045.00194

Date:

May 28, 2019

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1.0 INTRODUCTION & PROJECT OVERVIEW

The Project Site is located at 29497 – 29553 Mission Boulevard in the Mission-Garin Neighborhood in the City of Hayward (City). The site is approximately 96,268 square feet (2.21 acres) and is vacant. See Figure 1, Aerial Photograph of the Project Site. The Project includes the construction of a 5-story affordable housing building with 140 units, 4,504 square feet of ground floor retail and daycare uses, and 101 parking spaces (see Figure 2, Project Site Plan). This analysis assumes the Project will be operational by 2021.

The Project Site is generally bounded by Mission Boulevard to the northeast, Dixon Street to the southwest, Industrial Parkway to the southeast, and Valle Vista Avenue to the northwest. The site is zoned S-T5 and has a General Plan Designation of "Sustainable Mixed-Use." Uses surrounding the Project Site include adjacent commercial uses to the southeast and northwest, adjacent residences to the southwest, and commercial uses to the northeast across Mission Boulevard. As stated, the Project Site is located along Mission Boulevard. Mission Boulevard is a north-south regional roadway facility which has been designated as State Route 238.

The Project Site is subject to the Hayward Municipal Code (HMC) Section 10-24.296, which requires properties located within 500 feet of the curb line of Mission Boulevard (State Route 238 or Highway 238) to address health risks associated with traffic-related emissions.[1] As a supplemental technical report, a Health Risk Assessment (HRA) can provide valuable information to applicants and the City in understanding any potential health risks associated with a project and guide in the design and incorporation of recommended strategies that lessen the effects of air pollution exposure. It should also be noted that California Supreme Court case law[2] has determined that agencies subject to the California Environmental Quality Act (CEQA) generally are not required to analyze or mitigate the impact of existing environmental conditions on a project's future users or residents. As such, this HRA has been prepared for informational purposes consistent with City[3] and State[4] policies.

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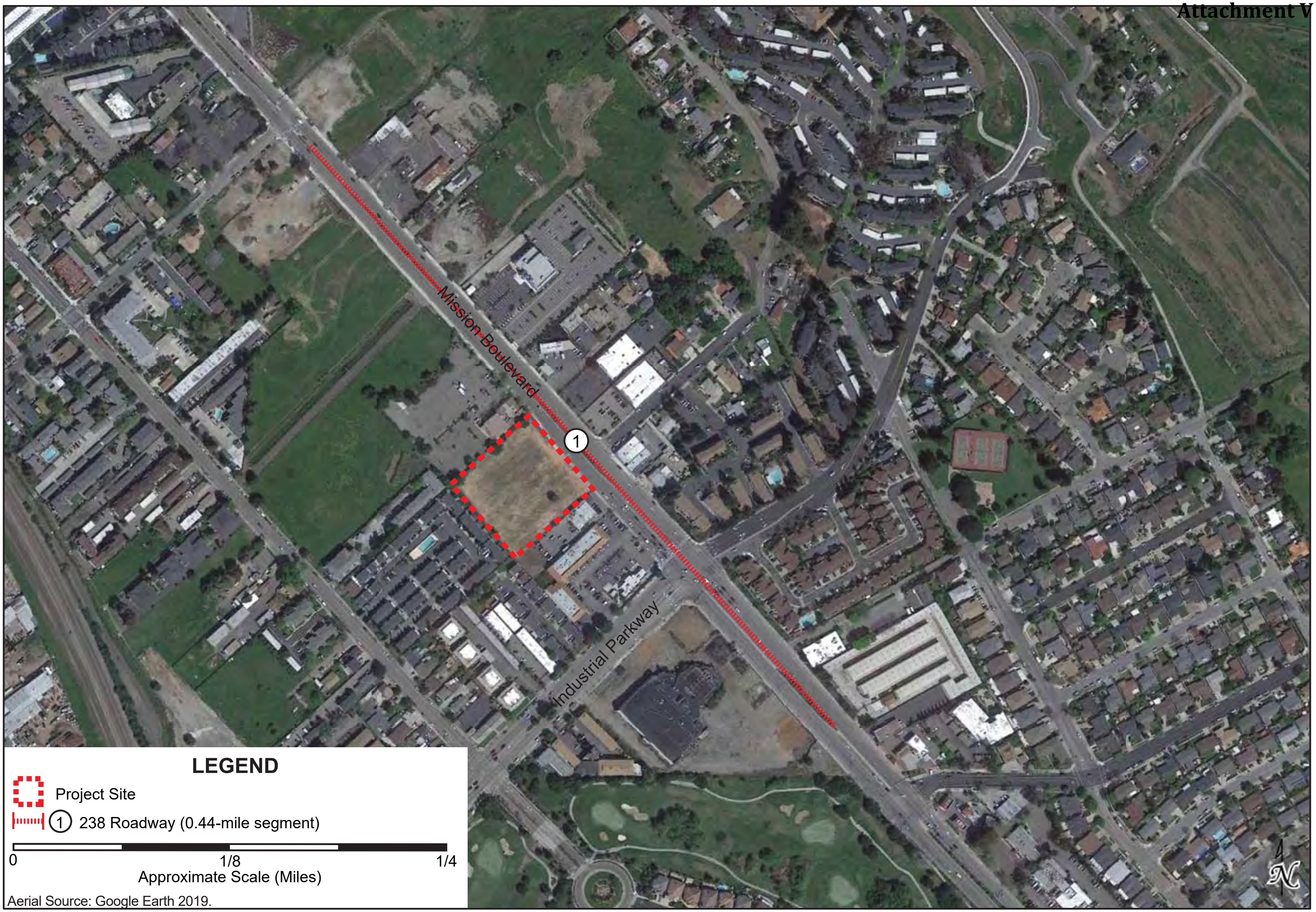
[1] *City of Hayward Municipal Code Section 10-24.296.*

[2] *Supreme Court of California, California Building Industry Association v. Bay Area Air Quality Management District (2015), S213478, Ct.App. 1/5, A135335, A136212, Alameda County, Super. Ct. No. RG10548693.*

[3] *City of Hayward Municipal Code Section 10-24.296.*

[4] *California Air Resources Board, Air Quality and Land Use Handbook, April 2005.*

Attachment V



Aerial Source: Google Earth 2019.

PROJECT LOCATION ROADWAY SOURCES

29497-29553 MISSION BLVD.
HAYWARD, CA 94544

efi global

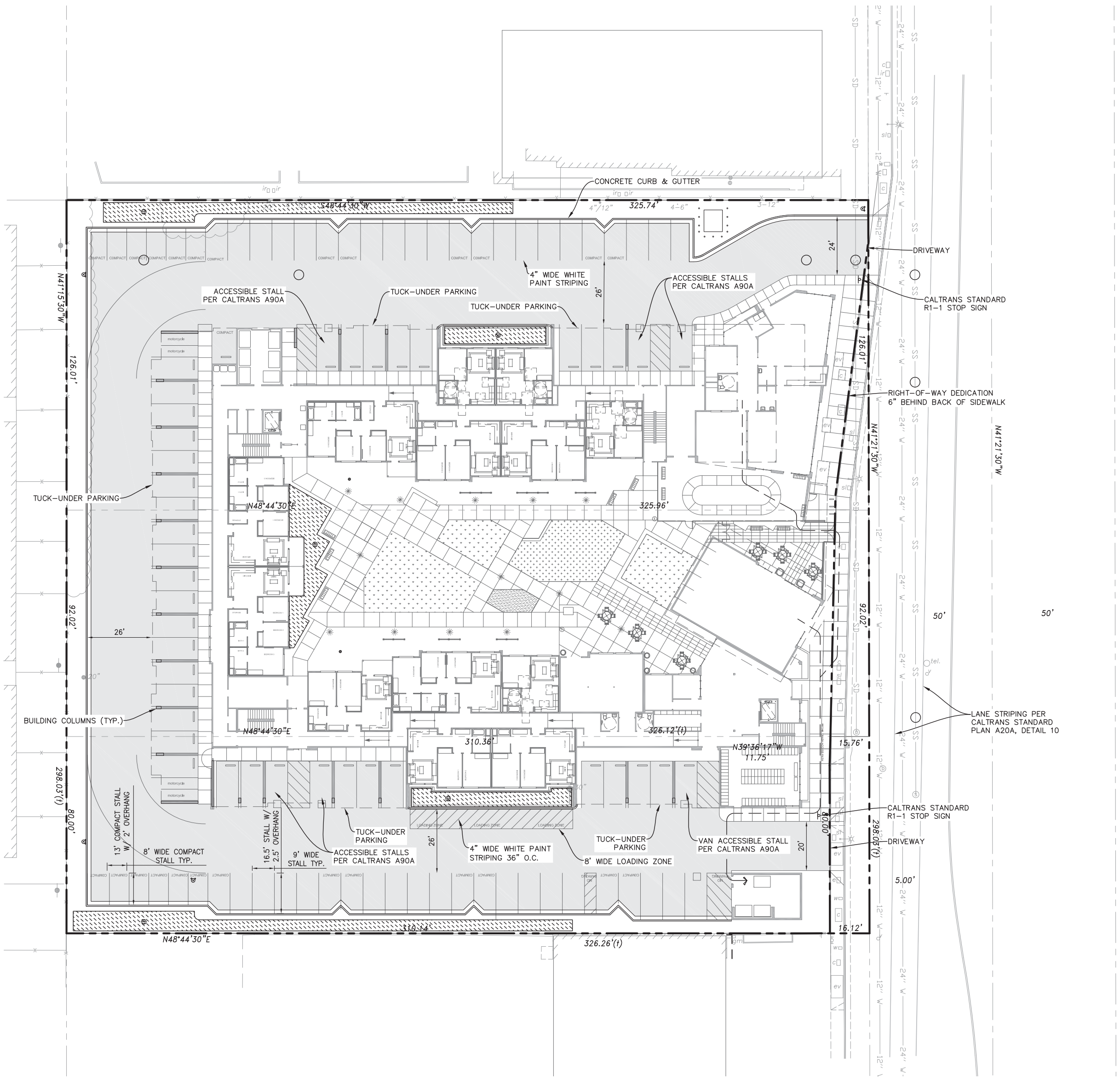
PN: 045.00194
DT: 5/14/19
DB: RG CB: RG

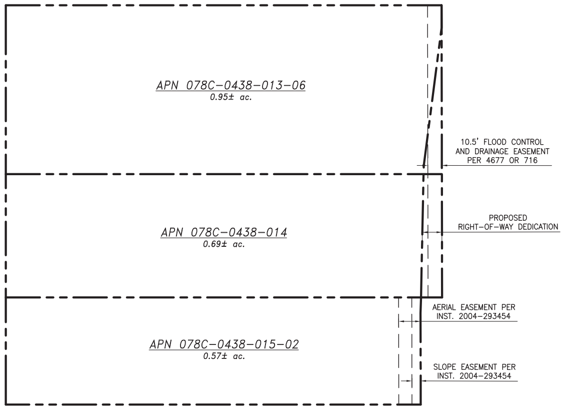
FIGURE
1

Attachment V

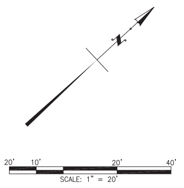
LEGEND:

- — - — PROPERTY LINE
- ▨ BIORETENTION AREA
- ▒ ASPHALT PAVEMENT





PARCEL EXHIBIT



SCALE: 1" = 20'

PROJECT SITE PLAN

29497-29553 MISSION BLVD.
HAYWARD, CA 94544

efi global

PN: 045.00194
DT: 5/14/19
DB: RG
CB: RG

FIGURE
2

2.0 ENVIRONMENTAL SETTING

2.1 Air Pollutants and Potential Health Effects

Certain air pollutants have been recognized to cause notable health problems and consequential damage to the environment either directly or in reaction with other pollutants, due to their presence in elevated concentrations in the atmosphere. Such pollutants have been identified and regulated as part of the overall endeavor to prevent further deterioration and facilitate improvement in air quality within the San Francisco Bay Area Air Basin (Basin). Both federal and state ambient air quality standards have been established for outdoor concentrations of these "criteria air pollutants" at levels considered safe to protect public health, including the health of "sensitive" populations, such as asthmatics, children, and the elderly, with a margin of safety; and to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

Air pollution studies have also shown an association between respiratory and other non-cancer health effects and proximity to major pollution sources such as freeways and high traffic roadways, rail yards, ports, refineries and gas stations that rises above the risks associated with regional air pollution in urban areas. Many of these studies have reported associations between residential proximity to high traffic roadways and a variety of respiratory symptoms, asthma exacerbations, and decreases in lung function in children. Other studies have shown that diesel exhaust and other cancer-causing chemicals emitted from cars and trucks are responsible for much of the overall cancer risk from airborne toxics in California.[5] The criteria air pollutants that are most relevant to current air quality planning and regulation in the Basin include ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), respirable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb).[6] Toxic air contaminants (TACs) and greenhouse gas (GHG) emissions are also of concern in the Basin.

TACs refer to a diverse group of air pollutants that include both organic and inorganic chemical substances that may be emitted from a variety of common sources including gasoline stations, motor vehicles, dry cleaners, industrial operations, painting operations, and research and teaching facilities. TACs are typically found in low concentrations in ambient air, especially in urban areas. TACs are different than "criteria" pollutants in that ambient air quality standards have not been established for them, largely because there are hundreds of air toxics and their effects on health tend to be felt on a local scale rather than on a regional basis. TACs are regulated at the regional, state, and federal level because chronic exposure can result in adverse health effects. TACs are known to cause or contribute to cancer or non-cancer health effects such

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[5] *California Air Resources Board, Air Quality and Land Use Handbook, April 2005.*

[6] *BAAQMD, Criteria Air Pollutants, website: http://www.baaqmd.gov/about-air-quality/research-and-data/emission-inventory/criteria-air-pollutants, accessed: May 2019.*

as birth defects, genetic damage, and other adverse health effects. Effects from TACs may be both chronic (i.e., of long duration) and acute (i.e., severe but of short duration) on human health. Acute health effects are attributable to sudden exposure to high quantities of air toxics. These effects include nausea, skin irritation, respiratory illness, and, in some cases, death. Chronic health effects result from low-dose, long-term exposure from routine releases of air toxics. The effect of major concern for this type of exposure is cancer, which requires a period of 10 to 30 years after exposure to develop. Diesel exhaust is the predominant TAC in urban air and is estimated to represent about two-thirds of the cancer risk from TACs (based on the statewide average). According to the ARB, diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, including benzene, formaldehyde, acrolein, butadiene, and acetaldehyde have been previously identified as TACs by the ARB, and are listed as carcinogens either under the state's Proposition 65 or under the federal Hazardous Air Pollutants programs.

2.2 Existing Air Quality

The BAAQMD conducts ambient air monitoring through a fixed-station network which consists of over 30 stations that collect local air quality data, including measurements of significant air pollutants.[7] The nearest monitoring station to the Project Site is the Hayward – La Mesa station which monitors emission levels of O_3. Table 1, Summary of Ambient Air Quality in the Project Vicinity, identifies the federal and state ambient air quality standards for the ambient O_3 concentrations that were measured between 2016 and 2018.[8] As shown, the most current O_3 concentrations were below the state and national 1-hour and 8-hour standards.

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[7] *BAAQMD, Air Quality Measurement, website: http://www.baaqmd.gov/about-air-quality/air-quality-measurement, accessed: May 2019.*

[8] *Most current air quality data available.*

Table 1
Summary of Ambient Air Quality in the Project Vicinity

Air Pollutants Monitored Within Hayward – La Mesa	**Year**		
	2016	**2017**	**2018**
Ozone (O_3)			
Maximum 1-hour concentration measured	0.083 ppm	0.139 ppm	0.075 ppm
National 0.12 ppm 1-hour standard exceeded?	No	Yes	No
State 0.09 ppm 1-hour standard exceeded?	No	Yes	No
Maximum 8-hour concentration measured	0.064 ppm	0.110 ppm	0.065 ppm
National 0.07 ppm 8-hour standard exceeded?	No	Yes	No
State 0.07 ppm 8-hour standard exceeded?	No	Yes	No

ppm = parts by volume per million of air
Source: BAAQMD, Air Monitoring Data, website: http://www.baaqmd.gov/about-air-quality/current-air-quality/air-monitoring-data?DataViewFormat=daily&DataView=aqi&ParameterId=316, accessed: May 2019.

3.0 REGULATORY FRAMEWORK

3.1 U.S. EPA

In addition to the criteria air pollutants for which there are National Ambient Air Quality Standards (NAAQS), U.S. EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries).

Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

The U.S. EPA is the lead Federal agency for administering the Clean Air Act and has certain responsibilities regarding the health effects of MSATs. In February 2007, the U.S. EPA finalized a rule to reduce hazardous air pollutants from mobile sources (*Control of Hazardous Air Pollutants from Mobile Sources, February 9, 2007*). The rule will limit the benzene content of gasoline and reduce toxic emissions from passenger vehicles and portable fuel containers (such as gas cans). The U.S. EPA estimates that in 2030 this rule would reduce total emissions of mobile source air toxics by 330,000 tons and VOC emissions (precursors to ozone and $PM_{2.5}$) by over 1 million tons.

3.2 State

3.2.1 Air Resources Board

The Air Resources Board (ARB), a part of the California Environmental Protection Agency (Cal/EPA), is responsible for the coordination and administration of both federal and state air pollution control programs within California. In this capacity, the ARB conducts research, sets CAAQS, compiles emission inventories, develops suggested control measures, and provides oversight of local programs. The ARB establishes emissions standards for motor vehicles sold in California, consumer products (such as hair spray, aerosol paints, and barbecue lighter fluid), and various types of commercial equipment. The ARB also sets fuel specifications to further reduce vehicular emissions.

In its Air Quality and Land Use Handbook, ARB states, "Air pollution studies indicate that living close to high traffic and the associated emissions may lead to adverse health effects beyond those associated with regional air pollution in urban areas."[9] The Air Quality and Land Use Handbook cites several studies linking adverse respiratory health effects (e.g., asthma) to proximity to roadways with heavy traffic densities, where the distances between the roadway and the receptors were 300 to 1,000 feet. Other studies suggest that such impacts diminish with distance, and a substantial benefit occurs if the separation distance is greater than 300 to 500 feet. The Air Quality and Land Use Handbook, which is intended to serve as a general reference guide for planning agencies to evaluate and reduce air pollution impacts associated with new projects that go through the land use decision-making process, contains general recommendations that may reduce potential health impacts by establishing a buffer zone or setback between sensitive land uses and sources of toxic air contaminants. Specifically, with respect to land uses located near freeways and other heavily traveled roadways, ARB recommends that lead agencies avoid citing new sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles per day, or rural roads with 50,000 vehicles per day.

3.3 Regional

3.3.1 Bay Area Air Quality Management District (BAAQMD)

The BAAQMD is the agency principally responsible for comprehensive air pollution control in the Basin. To that end, the BAAQMD works directly with the Association of Bay Area Governments (ABAG), county transportation commissions and local governments, and cooperates actively with all state and federal government agencies. The BAAQMD develops rules and regulations, establishes permitting requirements, inspects emissions sources, and provides regulatory enforcement through such measures as educational

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[9] *California Environmental Protection Agency, California Air Resources Board, Air Quality and Land Use Handbook: A Community Health Perspective, (2005).*

programs or fines, when necessary. Although the BAAQMD is responsible for regional air quality planning efforts, BAAQMD does not have the authority to directly regulate the air quality issues associated with plans and new development projects within the Basin. Instead, the BAAQMD has prepared the CEQA Air Quality Guidelines to assist Lead Agencies, as well as consultants, project proponents, and other interested parties, in evaluating potential air quality impacts of projects and plans proposed in the Basin.

3.3.2 California Air Pollution Control Officers Association (CAPCOA)

In order to provide consistency to lead agencies, project proponents and the general public throughout the state, the CAPCOA formed a subcommittee composed of representatives from the Planning Managers Committee and the Toxic Risk Managers Committee to develop guidance on assessing the health risk impacts from and to proposed land use projects. CAPCOA published Health Risk Assessments for Proposed Land Use Projects in 2009 as a guidance document that focuses on the acute, chronic, and cancer impacts affecting proposed land use development. It also outlines the recommended procedures to identify when a project should undergo further risk evaluation, how to conduct the HRA, how to engage the public, what to do with the results from the HRA, and what mitigation measures may be appropriate for various land use projects.

3.4 Local

3.4.1 City of Hayward Municipal Code

As stated previously, the Project Site is subject to the HMC Section 10-24.296, which requires properties located within 500 feet of the curb line of Mission Boulevard to address health risks associated with traffic-related emissions.[10] Additionally, Section 10-24.296 of the HMC requires existing or new buildings to be occupied by sensitive receptors, to include and maintain in good working order a central heating and ventilation (HVAC) system or other air intake system in the building, or in each individual unit, that meets or exceeds an efficiency standard of MERV 13 or equivalent. The HVAC system shall include installation of a high efficiency filter and/or carbon filter to filter particulates and other chemical matter from entering the building.

4.0 HEALTH RISK ANALYSIS

4.1 Air Quality Standards

At the federal level, the NAAQS are defined as the maximum acceptable concentration that may be reached, but not exceeded more than once per year. California has adopted more stringent ambient air quality

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[10] *City of Hayward Municipal Code Section 10-24.296.*

standards for most of the criteria air pollutants. Table 2 presents both sets of ambient air quality standards (i.e., national and State) and the Basin's attainment status for each standard.

4.2 Methodology

4.2.1 Source Identification

Consistent with BAAQMD recommendations, the roadway segment and length analyzed in this study was determined based on roadway segments located within an approximate 1,000-foot radius of the Project Site boundaries.[11] Table 3 presents the annual average daily traffic volumes (AADT) and peak hour traffic volumes for the Highway 238. It should also be noted the vehicle mix and truck volume by type was also considered in this assessment. Per Caltrans EMFAC, this assessment assumes 9.1% of the AADT volume would consist of trucks. Specifically, approximately 2.1% of AADT would consist of light heavy duty trucks, and 7.0% of AADT would consist of medium heavy duty and heavy duty trucks.

Table 2
Ambient Air Quality Standards and Attainment Status for the San Francisco Bay Area Air Basin

Air Pollutant	Averaging Time	State Standard	Federal Standard	BAAQMD Attainment Status	
				California Standard	Federal Primary Standard
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m^3)	Revoked	Non-attainment	Non-attainment
	8 Hour	0.070 ppm (137µg/m^3)	0.070 ppm (137µg/m^3)		
Carbon Monoxide (CO)	1 Hour	20.0 ppm (23,000 µg/m^3)	35.0 ppm (40,000 µg/m^3)	Attainment	Attainment
	8 Hour	9.0 ppm (10,000 µg/m^3)	9.0 ppm (10,000 µg/m^3)		
Nitrogen Dioxide (NO_2)	1 Hour	0.18 ppm (339 µg/m^3)	0.10 ppm (188 µg/m^3)	Attainment	--
	Annual	0.03 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)	--	Attainment
Lead (Pb)	30 Day Avg.	1.5 µg/m^3	--	--	Attainment
	Calendar Qtr.	--	0.15 µg/m^3		
Sulfur Dioxide (SO_2)	24 Hour	0.04 ppm	--	Attainment	--
Particulate Matter 10 (PM_{10})	24 Hour	50.0 µg/m^3	150.0 µg/m^3	Non-attainment	Unclassified
	Annual	20.0 µg/m^3	--	Non-attainment	--
Particulate Matter 2.5	24 Hour	--	35.0 µg/m^3	--	Non-attainment

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[11] *BAAQMD, California Environmental Quality Act, Air Quality Guidelines, May 2017.*

Air Pollutant	Averaging Time	State Standard	Federal Standard	BAAQMD Attainment Status	
				California Standard	Federal Primary Standard
(PM$_{2.5}$)	Annual	12.0 µg/m^3	12.0 µg/m^3	Non-attainment	Unclassified/ Attainment
Sulfates	24 Hour	25 µg/m^3	--	Attainment	--

Notes: ppm = parts by volume per million of air; µg/m^3=micrograms per cubic meter
Sources: California Air Resources Board, Ambient Air Quality Standards: http://www.arb.ca.gov/research/aaqs/aaqs2.pdf and: BAAQMD, Air Quality Standards and Attainment Status, website: http://www.baaqmd.gov/about-air-quality/research-and-data/air-quality-standards-and-attainment-status , accessed: May 2019.

Table 3
Roadway Traffic Volume

Source/Roadway Segment	AADT
Mission/Highway 238; Fronting Project Site (0.44-mile segment)	33,255

Source: Per Project traffic engineer.

4.2.2 Emissions Calculations

Vehicle emissions contribute significantly to localized concentrations of air contaminants. Typically, emissions generated from these sources are characterized by vehicle mix, the rate pollutants are generated during the course of travel (i.e., the speed of travel), and the number of vehicles traversing the roadway network. The CT-EMFAC2014[12] model was used to estimate diesel particulate matter (DPM). This study focuses on DPM emissions as they are key driver for air toxics risk. Appendix B to this assessment includes the detailed results for the CT-EMFAC2014 model scenarios.

4.2.3 Dispersion Modeling

The AMS/EPA Regulatory Model (AERMOD) was utilized to quantify the concentrations of DPM at the Project Site. AERMOD is steady-state plume modeling system specially designed to support the EPA's regulatory modeling programs. AERMOD allows the user to conduct site-specific modeling with the use of various inputs including source types, receptor locations, terrain data, meteorological conditions, and much more. Consistent with District recommendations, the roadway segments for this assessment were modeled as line sources represented by separated volume sources. Discrete receptors were placed on the Project Site boundaries and within the Project Site to represent ground-level receptors at the Project Site

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[12] *CT-EMFAC2014 models on-road vehicle emissions for criteria pollutants, mobile source air toxics (MSATs), and carbon dioxide (CO_2). The tool's underlying data are based on the CARB EMFAC2014 on-road emissions model and CARB-supplied/EPA-supplied MSAT speciation factors. Website: http://www.dot.ca.gov/hq/env/air/pages/ctemfac_license.htm.*

(i.e., worst-case locations). Meteorological data for the project area was imported from the CARB online database. The terrain data for the Project area was applied from the USGS online database. For all of the remaining details regarding the inputs and assumptions used in the dispersion modeling, please refer to Appendix C to this HRA, which includes the AERMOD output files.

4.2.4 Carcinogenic Risk Calculations

OEHHA recommends that an exposure duration (residency time) of 30 years be used to estimate individual cancer risk for the maximally exposed individual resident (MEIR). OEHHA also recommends that the 30-year exposure duration be used as the basis for public notification and risk reduction audits and plans. The Districts, however, may opt to use the 70-year exposure duration risk for notification and risk reduction audits and plans. Note that the 30-year exposure duration starts in the third trimester to accommodate the increased susceptibility of exposures in early life (OEHHA, 2009). Exposure durations of 9-years and 70-years are also recommended to be evaluated for the MEIR to show the range of cancer risk based on residency periods. The 9-, 30-, and 70-year exposures are chosen to coincide with U.S. EPA’s estimates of the average (9 years), high-end estimates (30 years) of residence time, and a lifetime residency (70 years). These estimates are also consistent with what is known about residence time in California. Together, the 9-, 30-, and 70-year cancer risk calculations provide a useful presentation of cancer risk and the relationship to duration of residency. See Appendix A to this HRA for a detailed breakdown of the assumptions utilized in this analysis for each residency period.

4.2.5 Non-Carcinogenic Risk Calculations

Noncancer chronic inhalation impacts are calculated by dividing the annual average concentration by the Reference Exposure Level (REF) for that substance. The REL is defined as the concentration at which no adverse noncancer health effects are anticipated.

For a single substance, this result is called the Hazard Quotient (HQ). The following equation is used to calculate the HQ:

$HQ = C_i/REL_i$

Where:

C_i = Concentration in the air of substance i

REL_i = Chronic noncancer Reference Exposure Level for substance i

For multiple substances, the Hazard Index (HI) is calculated. The HI is calculated by summing the HQs from all substances that affect the same organ system.

4.3 Carcinogenic Risk Results

As shown in Table 4, the summation of carcinogenic risk from DPM for the worst-case ground level location at the Project Site totaled a carcinogenic risk of 6.08 per one million for the 9-year residential scenario, 8.28 per one million for the 30-year residential scenario, and 9.66 per one million for the 70-year residential scenario. Thus, the Project's residents would not be exposed to carcinogenic risks above 10 per one million. And, as the Project consists of affordable housing, the Project's fleet mix would primarily consist of light duty and non-diesel vehicles and would thus not have the potential to substantively exacerbate the health risks along Mission/238. Appendix A to this HRA provides a detailed breakdown of these calculations.

Table 4
Summary of Existing Carcinogenic Risks Along Mission Blvd./SR-238

Risk Scenario	Carcinogenic Risk Per One Million
9-Year Residential Scenario	6.08
30-Year Residential Scenario	8.28
70-Year Residential Scenario	9.66
See calculation worksheets presented in Appendix A.	

4.4 Non-Carcinogenic Health Risk Results

To quantify non-carcinogenic health risks at the Project Site, the hazard index approach was used. This approach assumes that chronic sub-threshold exposures adversely affect a specific organ or organ system (toxicological endpoint). To calculate the hazard index, the DPM concentration is divided by the appropriate toxicity value. Where the value is equal to or exceeds one, a health hazard is presumed to exist. As detailed in Appendix A to this HRA, a maximum chronic hazard index of 0.003 would occur for the Project Site's worst-case location, which is below the threshold of 1.0.

5.0 CONCLUSION AND RECOMMENDATIONS

As stated above, the summation of carcinogenic risk from DPM for the worst-case ground level location at the Project Site is below 10 per one million for all scenarios. As discussed above, a maximum chronic hazard index of 0.003 would occur for the Project Site's worst-case location, which is below the BAAQMD recommended threshold of 1.0. As such, aside from code-compliance measures noted below, no additional or special project design features are warranted for the Project. Consistent with Section 10-24.296 of the HMC, the Project will include and maintain in good working order a central heating and ventilation (HVAC) system or other air intake system in the building, or in each individual unit, that meets or exceeds an efficiency standard of MERV 13 or equivalent. The HVAC system shall include installation of a high efficiency filter and/or carbon filter to filter particulates and other chemical matter from entering the building. As such, the

Project would be consistent with City and BAAQMD policies and standards with respect to the existing health risks at the Project Site.

Prepared by: Date: May 28, 2019

Brett Pomeroy
Environmental Consultant

Reviewed By: Date: May 28, 2019

Raul Gaina

Project Manager

6.0 REFERENCES

AMS/EPA Regulatory Model (AERMOD)
California Air Pollution Control Officers Association (CAPCOA)
    Health Risk Assessments for Proposed Land Use Project, Guidance Document, July 2009
California Air Resources Board (ARB)
    Air Quality and Land Use Handbook, April 2005
    Ambient Air Quality Standards (http://www.arb.ca.gov/research/aaqs/aaqs2.pdf)
    State Area Designation Maps (http://www.arb.ca.gov/desig/adm/adm.htm)
California Department of Transportation (Caltrans)
    CT-EMFAC2014 (http://www.dot.ca.gov/hq/env/air/pages/ctemfac_license.htm)
California Office of Environmental Health Hazard Assessment (OEHHA)
    Air Toxics Hot Spots Program Guidance Manual for the Preparation of Risk, 2015
  Hot Spots Unit Risk and Cancer Potency Values
  (http://www.oehha.ca.gov/air/hot_spots/2009/AppendixA.pdf)
  Acute and Chronic REL Summary (http://www.oehha.ca.gov/air/allrels.html)
Google Earth, 2019
Bay Area Air Quality Management District (BAAQMD)
    Health Risk Assessment (HRA) Guidelines (January 2016)
    CEQA Air Quality Guidelines (May 2017)
    Historical Data by Year
    Meteorological Data for AERMOD

Appendix A

Carcinogenic Risk & Non-Carcinogenic Health Calculations

Carcinogenic Risk Summary (Risks Per Million)	
9-Year Residency	6.08E+00
30-Year Residency	8.28E+00
70-Year Residency	9.66E+00
25-Year Worker	6.28E-01

Notes:

9-Year Residency Risk = 3rd Trimester to Birth Risk + 0<2 Risk + 2<9 Risk
30-Year Residency Risk = 3rd Trimester to Birth Risk + 0<2 Risk + 2<16 Risk + 16<30 Risk
70-Year Residency Risk = 3rd Trimester to Birth Risk + 0<2 Risk + 2<16 Risk + 16<70 Risk
See following pages for calculation details for each risk scenario

Attachment V

Carcinogenic Risks - 3rd Trimester to Birth

Source	Concentration		Weight Fraction	Contaminant	Carcinogenic Risk		
	(ug/m3)	(mg/m3)			URF[a] (ug/m3)	CPF[a] (mg/kg/day)	RISK (per million)
Mission/238	1.40E-02	1.40E-05	1.00E+00	DPM	3.00E-04	1.10E+00	1.62E-01
						Totals	1.62E-01

[a] http://www.oehha.ca.gov/air/hot_spots/2009/AppendixA.pdf (updated 2011)

Assumptions (per OEHHA Guidance Manual for Preparation of HRAs, Appendix I, February 2015)

Daily Breathing Rate	361 L/kg-day (95th percentile); per ARB Risk Management Guidance 2015
Inhalation Absorbtion	1
Exposure Frequency	350 days
Age Sensitivity Factor	10
Fraction At Home	0.85
Exposure Duration	0.25 years
Averaging Time	70 years (25,550 days)

Carcinogenic Risks - 0<2

Source	Concentration		Weight Fraction	Contaminant	Carcinogenic Risk		
	(ug/m3)	(mg/m3)			URF[a] (ug/m3)	CPF[a] (mg/kg/day)	RISK (per million)
Mission/238	1.40E-02	1.40E-05	1.00E+00	DPM	3.00E-04	1.10E+00	3.91E+00
						Totals	3.91E+00

[a] http://www.oehha.ca.gov/air/hot_spots/2009/AppendixA.pdf (updated 2011)

<u>Assumptions (per OEHHA Guidance Manual for Preparation of HRAs, Appendix I, February 2015)</u>

Daily Breathing Rate	1090 L/kg-day (95th percentile); per ARB Risk Management Guidance 2015
Inhalation Absorbtion	1
Exposure Frequency	350 days
Age Sensitivity Factor	10
Fraction At Home	0.85
Exposure Duration	2 years
Averaging Time	70 years (25,550 days)

Carcinogenic Risks - 2<9

Source	Concentration		Weight Fraction	Contaminant	Carcinogenic Risk		
	(ug/m3)	(mg/m3)			URF[a] (ug/m3)	CPF[a] (mg/kg/day)	RISK (per million)
Mission/238	1.40E-02	1.40E-05	1.00E+00	DPM	3.00E-04	1.10E+00	2.01E+00
						Totals	2.01E+00

[a] http://www.oehha.ca.gov/air/hot_spots/2009/AppendixA.pdf (updated 2011)

<u>Assumptions (per OEHHA Guidance Manual for Preparation of HRAs, Appendix I, February 2015)</u>

Daily Breathing Rate	631 L/kg-day (80th percentile); per ARB Risk Management Guidance 2015
Inhalation Absorbtion	1
Exposure Frequency	350 days
Age Sensitivity Factor	3
Fraction At Home	0.72
Exposure Duration	7 years
Averaging Time	70 years (25,550 days)

Carcinogenic Risks - 2<16

Source	Concentration		Weight Fraction	Contaminant	Carcinogenic Risk		
	(ug/m3)	(mg/m3)			URF[a] (ug/m3)	CPF[a] (mg/kg/day)	RISK (per million)
Mission/238	1.40E-02	1.40E-05	1.00E+00	DPM	3.00E-04	1.10E+00	3.65E+00
						Totals	3.65E+00

[a] http://www.oehha.ca.gov/air/hot_spots/2009/AppendixA.pdf (updated 2011)

<u>Assumptions (per OEHHA Guidance Manual for Preparation of HRAs, Appendix I, February 2015)</u>

Daily Breathing Rate	572 L/kg-day (80th percentile); per ARB Risk Management Guidance 2015
Inhalation Absorbtion	1
Exposure Frequency	350 days
Age Sensitivity Factor	3
Fraction At Home	0.72
Exposure Duration	14 years
Averaging Time	70 years (25,550 days)

Attachment V

Carcinogenic Risks - 16<30

Source	Concentration		Weight Fraction	Contaminant	Carcinogenic Risk		
	(ug/m3)	(mg/m3)			URF[a] (ug/m3)	CPF[a] (mg/kg/day)	RISK (per million)
Mission/238	1.40E-02	1.40E-05	1.00E+00	DPM	3.00E-04	1.10E+00	5.63E-01
						Totals	5.63E-01

[a] http://www.oehha.ca.gov/air/hot_spots/2009/AppendixA.pdf (updated 2011)

Assumptions (per OEHHA Guidance Manual for Preparation of HRAs, Appendix I, February 2015)

Daily Breathing Rate	261 L/kg-day (80th percentile); per ARB Risk Management Guidance 2015
Inhalation Absorbtion	1
Exposure Frequency	350 days
Age Sensitivity Factor	1
Fraction At Home	0.73
Exposure Duration	14 years
Averaging Time	70 years (25,550 days)

Carcinogenic Risks - 16<70

Source	Concentration		Weight Fraction	Contaminant	Carcinogenic Risk		
	(ug/m3)	(mg/m3)			URF[a] (ug/m3)	CPF[a] (mg/kg/day)	RISK (per million)
Mission/238	1.40E-02	1.40E-05	1.00E+00	DPM	3.00E-04	1.10E+00	1.94E+00
						Totals	1.94E+00

[a] http://www.oehha.ca.gov/air/hot_spots/2009/AppendixA.pdf (updated 2011)

Assumptions (per OEHHA Guidance Manual for Preparation of HRAs, Appendix I, February 2015)

Daily Breathing Rate	233 L/kg-day (80th percentile); per ARB Risk Management Guidance 2015
Inhalation Absorbtion	1
Exposure Frequency	350 days
Age Sensitivity Factor	1
Fraction At Home	0.73
Exposure Duration	54 years
Averaging Time	70 years (25,550 days)

Carcinogenic Risks - 25 Year Worker

Source	Concentration		Weight Fraction	Contaminant	Carcinogenic Risk		
	(ug/m3)	(mg/m3)			URF[a] (ug/m3)	CPF[a] (mg/kg/day)	RISK (per million)
Mission/238	1.40E-02	1.40E-05	1.00E+00	DPM	3.00E-04	1.10E+00	6.28E-01
						Totals	6.28E-01

[a] http://www.oehha.ca.gov/air/hot_spots/2009/AppendixA.pdf (updated 2011)

Assumptions (per OEHHA Guidance Manual for Preparation of HRAs, Appendix I, February 2015)

Daily Breathing Rate	170 L/kg-day (Averagre rate for an 8-hour work day for moderate intensity activities)
Inhalation Absorbtion	1
Exposure Frequency	245 days (5 days per week for 49 weeks per yr)
Age Sensitivity Factor	1
Exposure Duration	25 years
Averaging Time	70 years (25,550 days)

Attachment V

Chronic Noncarcinogenic Hazards

Source	Concentration		Weight Fraction	Contaminant	Chronic Noncarcinogenic Hazards/Toxicological Endpoints								
	(ug/m3)	(mg/m3)			REL[a] (ug/m3)	RESP	CNS/PNS	CV/BL	IMMUN	KIDN	GI/LV	REPRO	EYES
Mission/238	1.40E-02	1.40E-05	1.00E+00	DPM	5.00E+00	2.80E-03							
					Totals	2.80E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

[a] http://www.oehha.ca.gov/air/allrels.html

Toxicological Endpoints

RESP	Respiratory System
CNS/PNS	Central/Peripheral Nervous System
CV/BL	Cardiovascular/Blood System
IMMUN	Immune System
KIDN	Kidney
GI/LV	Gastrointestinal System/Liver
REPRO	Reproductive System
EYES	Eye irritation

Appendix B

Traffic Data & Emission Factors

Attachment V

Peak Hour Intersection Counts
Meta Housing Study

Peak Hour: 7:15 AM

AM Peak Hour														
#	Intersection	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Mission Blvd/ Tennyson Rd	196	1,111	-	8	1,657	239	329	3	248	7	5	1	3,804
2	Mission Blvd / Valle Vista Ave	60	1,258	-	-	1,912	39	16	-	30	-	-	-	3,315
3	Mission Blvd /Industrial Parkway	310	766	14	87	1,173	657	254	133	291	22	257	288	4,252
4	Mission Blvd / Garin Ave	-	969	20	85	1,407	-	-	-	-	21	-	104	2,606
5	Mission Blvd / Arrowhead Way	15	947	8	35	1,386	4	24	25	54	19	25	23	2,565
6	Mission Blvd / Fairway St	1	752	32	20	1,372	61	176	89	15	63	25	41	2,647
7	Dixon St / Industrial Pkwy	119	28	14	115	25	255	183	539	29	5	1,202	65	2,579
	sum	701	5,831	88	350	8,932	1,255	982	789	667	137	1,514	522	21,768

Peak Hour: 4:50 PM

PM Peak Hour														
#	Intersection	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Mission Blvd/ Tennyson Rd	380	1,695	1	32	1,198	328	352	4	248	9	17	2	4,266
2	Mission Blvd / Valle Vista Ave	41	2,035	-	13	1,417	40	22	-	35	-	-	-	3,603
3	Mission Blvd /Industrial Parkway	252	1,345	11	104	966	302	534	168	450	6	131	175	4,444
4	Mission Blvd / Garin Ave	-	1,490	33	127	1,296	-	-	-	-	33	-	79	3,058
5	Mission Blvd / Arrowhead Way	60	1,469	32	43	1,275	24	11	17	35	19	16	41	3,042
6	Mission Blvd / Fairway St	7	1,422	88	38	1,209	94	133	66	11	34	26	15	3,143
7	Dixon St / Industrial Pkwy	68	31	13	65	22	233	183	1,116	74	8	626	94	2,533
		808	9,487	178	422	7,383	1,021	1,235	1,371	853	109	816	406	24,089

ADT - Daily Estimate

ADT - Daily Count Estimate														
#	Intersection	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Mission Blvd/ Tennyson Rd	2,880	14,030	5	200	14,275	2,835	3,405	35	2,480	80	110	15	40,350
2	Mission Blvd / Valle Vista Ave	505	16,465	-	65	16,645	395	190	-	325	-	-	-	34,590
3	Mission Blvd /Industrial Parkway	2,810	10,555	125	955	10,695	4,795	3,940	1,505	3,705	140	1,940	2,315	43,480
4	Mission Blvd / Garin Ave	-	12,295	265	1,060	13,515	-	-	-	-	270	-	915	28,320
5	Mission Blvd / Arrowhead Way	375	12,080	200	390	13,305	140	175	210	445	190	205	320	28,035
6	Mission Blvd / Fairway St	40	10,870	600	290	12,905	775	1,545	775	130	485	255	280	28,950
7	Dixon St / Industrial Pkwy	935	295	135	900	235	2,440	1,830	8,275	515	65	9,140	795	25,560
		7,545	76,590	1,330	3,860	81,575	11,380	11,085	10,800	7,600	1,230	11,650	4,640	229,285

Note: ADT is estimated as adt= 5*(AM+PM)

ADT Volume - Mission Segment Fronting Site: 33,255

DPM Calculations (see CT EMFAC attached)

	Total Daily Grams	**Grams/Sec**
Opening year 2021:	25.00	
2022	22.60	
2023	15.00	
Avg Day:	**20.90**	**0.0002**

Attachment V

```
          File Name: Alameda (SF) - 2021 - Annual.EC
 CT-EMFAC Version: 6.0.0.29548
               Area: Alameda (SF)
      Analysis Year: 2021
             Season: Annual

=======================================================================

Vehicle Category    VMT Fraction        Diesel VMT Fraction
                    Across Category     Within Category
     Truck 1                   0.022        0.523
     Truck 2                   0.067        0.968
     Non-Truck                 0.911        0.014

=======================================================================

   Road Length:                 0.44 miles
     Volume:                    1386 vehicles per hour
 Number of Hours:                 24 hours
Avg. Idling Time:                  0 minutes per vehicle
Tot. Idling Time:                  0 hours

VMT Distribution by Speed (mph):
                                   5            0.00%
                                  10            0.00%
                                  15            0.00%
                                  20            0.00%
                                  25            0.00%
                                  30            0.00%
                                  35            0.00%
                                  40          100.00%
                                  45            0.00%
                                  50            0.00%
                                  55            0.00%
                                  60            0.00%
                                  65            0.00%
                                  70            0.00%
                                  75            0.00%

=========================================================================================================================

Summary of Project Emissions

                    Running Exhaust  Idling Exh  Running   Tire W   Brake W   Total    Total
   Pollutant Name      (grams)          (gram     (gram     (gram    (gram     (gram   (US tons)
Diesel PM                        25         0        -         -        -        25     <0.001

==========================================================END==========================================================
```

Attachment V

```
         File Name: Alameda (SF) - 2022 - Annual.EC
 CT-EMFAC Version: 6.0.0.29548
              Area: Alameda (SF)
     Analysis Year: 2022
            Season: Annual

=======================================================================

Vehicle Category   VMT Fraction          Diesel VMT Fraction
                   Across Category      Within Category
     Truck 1                    0.021      0.537
     Truck 2                    0.069      0.969
     Non-Truck                   0.91      0.014

=======================================================================

   Road Length:                  0.44 miles
      Volume:                    1386 vehicles per hour
 Number of Hours:                  24 hours
Avg. Idling Time:                   0 minutes per vehicle
Tot. Idling Time:                   0 hours

VMT Distribution by Speed (mph):
                                    5              0.00%
                                   10              0.00%
                                   15              0.00%
                                   20              0.00%
                                   25              0.00%
                                   30              0.00%
                                   35              0.00%
                                   40            100.00%
                                   45              0.00%
                                   50              0.00%
                                   55              0.00%
                                   60              0.00%
                                   65              0.00%
                                   70              0.00%
                                   75              0.00%

========================================================================================================================

Summary of Project Emissions

                   Running Exhaust    Idling Exh  Running    Tire W    Brake W     Total      Total
   Pollutant Name      (grams)           (gram     (gram      (gram     (gram      (gram    (US tons)
Diesel PM                        22.6         0        -          -         -        22.6      <0.001

==========================================================END==========================================================
```

Attachment V

```
           File Name: Alameda (SF) - 2023 - Annual.EC
  CT-EMFAC Version: 6.0.0.29548
                   Area: Alameda (SF)
       Analysis Year: 2023
               Season: Annual

=====================================================================

Vehicle Category    VMT Fraction    Diesel VMT Fraction
                    Across Categc   Within Category
      Truck 1              0.021         0.551
      Truck 2              0.071         0.969
     Non-Truck             0.908         0.014

=====================================================================

  Road Length:                 0.44  miles
     Volume:                   1386  vehicles per hour
 Number of Hours:                24  hours
Avg. Idling Time:                 0  minutes per vehicle
Tot. Idling Time:                 0  hours

VMT Distribution by Speed (mph):
                                  5              0.00%
                                 10              0.00%
                                 15              0.00%
                                 20              0.00%
                                 25              0.00%
                                 30              0.00%
                                 35              0.00%
                                 40            100.00%
                                 45              0.00%
                                 50              0.00%
                                 55              0.00%
                                 60              0.00%
                                 65              0.00%
                                 70              0.00%
                                 75              0.00%

==============================================================================================================

Summary of Project Emissions

                    Running Exha  Idling Exh  Running   Tire We   Brake W    Total     Total
   Pollutant Name     (grams)        (gram     (gram     (gram     (gram     (gram   (US tons)
Diesel PM                  15            0        -         -         -         15     <0.001

=======================================================END=======================================================
```

Appendix C

AERMOD Input & Output

```
**
****************************************
**
** AERMOD Input Produced by:
** AERMOD View Ver. 9.6.5
** Lakes Environmental Software Inc.
** Date: 5/13/2019
** File: C:\Users\Brett Pomeroy\Dropbox\Pomeroy Environmental
Services\AERMOD\Hayward\Hayward.ADI
**
****************************************
**
**
****************************************
** AERMOD Control Pathway
****************************************
**
**
CO STARTING
   TITLEONE C:\Users\Brett Pomeroy\Dropbox\Pomeroy Environmental
Services\AERMOD
   MODELOPT DFAULT CONC
   AVERTIME ANNUAL
   URBANOPT 1663000 Alameda_County_Population
   POLLUTID DPM
   RUNORNOT RUN
   ERRORFIL Hayward.err
CO FINISHED
**
****************************************
** AERMOD Source Pathway
****************************************
**
**
SO STARTING
** Source Location **
** Source ID - Type - X Coord. - Y Coord. **
** ------------------------------------------------------------------
-------
** Line Source Represented by Adjacent Volume Sources
** LINE VOLUME Source ID = SLINE1
** DESCRSRC Mission
** PREFIX
** Length of Side = 23.00
** Configuration = Adjacent
** Emission Rate = 0.0002
** Elevated
** Vertical Dimension = 2.00
** SZINIT = 0.47
** Nodes = 2
** 583861.730, 4165403.092, 7.20, 0.00, 10.70
** 584191.204, 4165051.917, 13.03, 0.00, 10.70
```

```
** --------------------------------------------------------------
-------
   LOCATION L0000001     VOLUME   583869.599 4165394.706 7.49
   LOCATION L0000002     VOLUME   583885.336 4165377.932 7.46
   LOCATION L0000003     VOLUME   583901.073 4165361.159 7.42
   LOCATION L0000004     VOLUME   583916.810 4165344.385 7.39
   LOCATION L0000005     VOLUME   583932.547 4165327.612 7.64
   LOCATION L0000006     VOLUME   583948.283 4165310.838 8.16
   LOCATION L0000007     VOLUME   583964.020 4165294.065 8.69
   LOCATION L0000008     VOLUME   583979.757 4165277.291 9.01
   LOCATION L0000009     VOLUME   583995.494 4165260.518 8.86
   LOCATION L0000010     VOLUME   584011.231 4165243.744 9.26
   LOCATION L0000011     VOLUME   584026.968 4165226.971 9.79
   LOCATION L0000012     VOLUME   584042.705 4165210.197 9.86
   LOCATION L0000013     VOLUME   584058.442 4165193.424 9.88
   LOCATION L0000014     VOLUME   584074.179 4165176.650 10.36
   LOCATION L0000015     VOLUME   584089.916 4165159.877 10.88
   LOCATION L0000016     VOLUME   584105.653 4165143.104 11.41
   LOCATION L0000017     VOLUME   584121.389 4165126.330 11.93
   LOCATION L0000018     VOLUME   584137.126 4165109.557 11.95
   LOCATION L0000019     VOLUME   584152.863 4165092.783 12.85
   LOCATION L0000020     VOLUME   584168.600 4165076.010 12.67
   LOCATION L0000021     VOLUME   584184.337 4165059.236 12.78
** End of LINE VOLUME Source ID = SLINE1
** Source Parameters **
** LINE VOLUME Source ID = SLINE1
   SRCPARAM L0000001     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000002     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000003     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000004     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000005     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000006     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000007     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000008     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000009     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000010     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000011     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000012     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000013     0.000009524      0.00     10.70
0.47
```

```
   SRCPARAM L0000014     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000015     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000016     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000017     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000018     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000019     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000020     0.000009524      0.00     10.70
0.47
   SRCPARAM L0000021     0.000009524      0.00     10.70
0.47
** -----------------------------------------------------------------
-------
   URBANSRC ALL
   SRCGROUP ALL
SO FINISHED
**
****************************************
** AERMOD Receptor Pathway
****************************************
**
**
RE STARTING
   INCLUDED Hayward.rou
RE FINISHED
**
****************************************
** AERMOD Meteorology Pathway
****************************************
**
**
ME STARTING
   SURFFILE 724930.SFC
   PROFFILE 724930.PFL
   SURFDATA 23230 2009 OAKLAND/WSO_AP
   UAIRDATA 23230 2009 OAKLAND/WSO_AP
   PROFBASE 1.8 METERS
ME FINISHED
**
****************************************
** AERMOD Output Pathway
****************************************
**
**
OU STARTING
** Auto-Generated Plotfiles
   PLOTFILE ANNUAL ALL Hayward.AD\AN00GALL.PLT 31
```

```
   SUMMFILE Hayward.sum
OU FINISHED

 ***********************************
 *** SETUP Finishes Successfully ***
 ***********************************
```

```
 *** AERMOD - VERSION  18081 ***   *** C:\Users\Brett Pomeroy
\Dropbox\Pomeroy Environmental Services\AERMOD ***
05/13/19
 *** AERMET - VERSION  14134 ***   ***
***        23:05:57

PAGE   1
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN

                                            ***     MODEL SETUP
OPTIONS SUMMARY       ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 **Model Is Setup For Calculation of Average CONCentration
Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **NO PARTICLE DEPOSITION Data Provided.
 **Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses URBAN Dispersion Algorithm for the SBL for    21
Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =   1663000.0 ;  Urban Roughness Length =
1.000 m

 **Model Uses Regulatory DEFAULT Options:
         1. Stack-tip Downwash.
         2. Model Accounts for ELEVated Terrain Effects.
         3. Use Calms Processing Routine.
         4. Use Missing Data Processing Routine.
         5. No Exponential Decay.
         6. Urban Roughness Length of 1.0 Meter Assumed.

 **Other Options Specified:
         CCVR_Sub - Meteorological data includes CCVR
substitutions
         TEMP_Sub - Meteorological data includes TEMP
substitutions

 **Model Assumes No FLAGPOLE Receptor Heights.

 **The User Specified a Pollutant Type of:  DPM

 **Model Calculates ANNUAL Averages Only

 **This Run Includes:     21 Source(s);       1 Source Group(s);
and     153 Receptor(s)
```

```
                with:      0 POINT(s), including
                           0 POINTCAP(s) and      0 POINTHOR(s)
                 and:     21 VOLUME source(s)
                 and:      0 AREA type source(s)
                 and:      0 LINE source(s)
                 and:      0 OPENPIT source(s)
                 and:      0 BUOYANT LINE source(s) with      0
line(s)


 **Model Set To Continue RUNning After the Setup Testing.

 **The AERMET Input Meteorological Data Version Date:  14134

 **Output Options Selected:
          Model Outputs Tables of ANNUAL Averages by Receptor
          Model Outputs External File(s) of High Values for
Plotting (PLOTFILE Keyword)
          Model Outputs Separate Summary File of High Ranked
Values (SUMMFILE Keyword)

 **NOTE:  The Following Flags May Appear Following CONC Values:
c for Calm Hours

m for Missing Hours

b for Both Calm and Missing Hours

 **Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =
1.80 ;  Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                  Emission Units =
GRAMS/SEC                                ;  Emission Rate Unit
Factor =   0.10000E+07
                  Output Units   = MICROGRAMS/M**3

 **Approximate Storage Requirements of Model =      3.5 MB of
RAM.

 **Input Runstream File:          aermod.inp
 **Output Print File:             aermod.out

 **Detailed Error/Message File:   Hayward.err
 **File for Summary of Results:   Hayward.sum
```

```
 *** AERMOD - VERSION  18081 ***   *** C:\Users\Brett Pomeroy
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05/13/19
 *** AERMET - VERSION  14134 ***   ***
***        23:05:57

PAGE   2
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN


                                                  *** VOLUME
SOURCE DATA ***

               NUMBER EMISSION RATE                   BASE
RELEASE    INIT.    INIT.   URBAN  EMISSION RATE
   SOURCE       PART.  (GRAMS/SEC)     X        Y      ELEV.
HEIGHT      SY        SZ     SOURCE  SCALAR VARY
     ID         CATS.               (METERS) (METERS) (METERS)
(METERS) (METERS) (METERS)              BY
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 L0000001         0   0.95240E-05  583869.6 4165394.7     7.5
0.00    10.70     0.47     YES
 L0000002         0   0.95240E-05  583885.3 4165377.9     7.5
0.00    10.70     0.47     YES
 L0000003         0   0.95240E-05  583901.1 4165361.2     7.4
0.00    10.70     0.47     YES
 L0000004         0   0.95240E-05  583916.8 4165344.4     7.4
0.00    10.70     0.47     YES
 L0000005         0   0.95240E-05  583932.5 4165327.6     7.6
0.00    10.70     0.47     YES
 L0000006         0   0.95240E-05  583948.3 4165310.8     8.2
0.00    10.70     0.47     YES
 L0000007         0   0.95240E-05  583964.0 4165294.1     8.7
0.00    10.70     0.47     YES
 L0000008         0   0.95240E-05  583979.8 4165277.3     9.0
0.00    10.70     0.47     YES
 L0000009         0   0.95240E-05  583995.5 4165260.5     8.9
0.00    10.70     0.47     YES
 L0000010         0   0.95240E-05  584011.2 4165243.7     9.3
0.00    10.70     0.47     YES
 L0000011         0   0.95240E-05  584027.0 4165227.0     9.8
0.00    10.70     0.47     YES
 L0000012         0   0.95240E-05  584042.7 4165210.2     9.9
0.00    10.70     0.47     YES
 L0000013         0   0.95240E-05  584058.4 4165193.4     9.9
0.00    10.70     0.47     YES
 L0000014         0   0.95240E-05  584074.2 4165176.6    10.4
0.00    10.70     0.47     YES
 L0000015         0   0.95240E-05  584089.9 4165159.9    10.9
0.00    10.70     0.47     YES
```

```
 L0000016         0   0.95240E-05  584105.7 4165143.1    11.4
0.00    10.70     0.47     YES
 L0000017         0   0.95240E-05  584121.4 4165126.3    11.9
0.00    10.70     0.47     YES
 L0000018         0   0.95240E-05  584137.1 4165109.6    12.0
0.00    10.70     0.47     YES
 L0000019         0   0.95240E-05  584152.9 4165092.8    12.9
0.00    10.70     0.47     YES
 L0000020         0   0.95240E-05  584168.6 4165076.0    12.7
0.00    10.70     0.47     YES
 L0000021         0   0.95240E-05  584184.3 4165059.2    12.8
0.00    10.70     0.47     YES
```

```
 *** AERMOD - VERSION  18081 ***   *** C:\Users\Brett Pomeroy
\Dropbox\Pomeroy Environmental Services\AERMOD ***
05/13/19
 *** AERMET - VERSION  14134 ***   ***
***        23:05:57

PAGE   3
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN


                                           *** SOURCE IDs
DEFINING SOURCE GROUPS ***

 SRCGROUP ID                                                 SOURCE
IDs
 -----------                                                 -------
---


  ALL        L0000001    , L0000002    , L0000003    ,
L0000004    , L0000005    , L0000006    , L0000007    ,
L0000008    ,

             L0000009    , L0000010    , L0000011    ,
L0000012    , L0000013    , L0000014    , L0000015    ,
L0000016    ,

             L0000017    , L0000018    , L0000019    ,
L0000020    , L0000021    ,
```

```
 *** AERMOD - VERSION  18081 ***   *** C:\Users\Brett Pomeroy
\Dropbox\Pomeroy Environmental Services\AERMOD ***
05/13/19
 *** AERMET - VERSION  14134 ***   ***
***        23:05:57

PAGE   4
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN


                                          *** SOURCE IDs DEFINED
AS URBAN SOURCES ***

  URBAN ID   URBAN POP                                     SOURCE
IDs
  --------   ---------                                     -------
---


              1663000.   L0000001    , L0000002    ,
L0000003    , L0000004    , L0000005    , L0000006    ,
L0000007    ,
 L0000008    ,

             L0000009    , L0000010    , L0000011    ,
L0000012    , L0000013    , L0000014    , L0000015    ,
L0000016    ,

             L0000017    , L0000018    , L0000019    ,
L0000020    , L0000021    ,
```

```
 *** AERMOD - VERSION  18081 ***   *** C:\Users\Brett Pomeroy
\Dropbox\Pomeroy Environmental Services\AERMOD ***
05/13/19
 *** AERMET - VERSION  14134 ***   ***
***        23:05:57

PAGE   5
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN

                                             *** DISCRETE
CARTESIAN RECEPTORS ***
                                           (X-COORD, Y-COORD,
ZELEV, ZHILL, ZFLAG)

(METERS)

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( 583948.6, 4165173.1,       7.0,     411.0,       0.0);
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( 583927.3, 4165180.4,       6.5,     411.0,       0.0);
     ( 583934.4, 4165180.4,       6.7,     411.0,       0.0);
( 583941.5, 4165180.4,       6.9,     411.0,       0.0);
     ( 583948.6, 4165180.4,       7.0,     411.0,       0.0);
( 583955.7, 4165180.4,       7.0,     411.0,       0.0);
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( 583920.2, 4165187.8,       6.2,     411.0,       0.0);
     ( 583927.3, 4165187.8,       6.5,     411.0,       0.0);
( 583934.4, 4165187.8,       6.7,     411.0,       0.0);
     ( 583941.5, 4165187.8,       6.9,     411.0,       0.0);
( 583948.6, 4165187.8,       7.0,     411.0,       0.0);
     ( 583955.7, 4165187.8,       7.0,     411.0,       0.0);
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     ( 583906.0, 4165195.1,       6.0,     411.0,       0.0);
( 583913.1, 4165195.1,       6.0,     411.0,       0.0);
     ( 583920.2, 4165195.1,       6.2,     411.0,       0.0);
( 583927.3, 4165195.1,       6.5,     411.0,       0.0);
     ( 583934.4, 4165195.1,       6.7,     411.0,       0.0);
( 583941.5, 4165195.1,       6.9,     411.0,       0.0);
     ( 583948.6, 4165195.1,       7.0,     411.0,       0.0);
( 583955.7, 4165195.1,       7.1,     411.0,       0.0);
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( 583969.9, 4165195.1,       7.3,     422.0,       0.0);
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( 583906.0, 4165202.4,       6.0,     411.0,       0.0);
     ( 583913.1, 4165202.4,       6.0,     411.0,       0.0);
( 583920.2, 4165202.4,       6.2,     411.0,       0.0);
     ( 583927.3, 4165202.4,       6.5,     411.0,       0.0);
( 583934.4, 4165202.4,       6.7,     411.0,       0.0);
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( 583948.6, 4165202.4,       7.1,     411.0,       0.0);
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( 583962.8, 4165202.4,       7.3,     422.0,       0.0);
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( 583977.0, 4165202.4,       7.7,     422.0,       0.0);
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( 583898.9, 4165209.8,       6.0,     411.0,       0.0);
     ( 583906.0, 4165209.8,       6.0,     411.0,       0.0);
( 583913.1, 4165209.8,       6.0,     411.0,       0.0);
     ( 583920.2, 4165209.8,       6.2,     411.0,       0.0);
( 583927.3, 4165209.8,       6.5,     411.0,       0.0);
     ( 583934.4, 4165209.8,       6.7,     411.0,       0.0);
( 583941.5, 4165209.8,       6.9,     411.0,       0.0);
     ( 583948.6, 4165209.8,       7.1,     422.0,       0.0);
( 583955.7, 4165209.8,       7.3,     422.0,       0.0);
     ( 583962.8, 4165209.8,       7.5,     422.0,       0.0);
( 583969.9, 4165209.8,       7.7,     422.0,       0.0);
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( 583906.0, 4165217.1,       6.0,     411.0,       0.0);
     ( 583913.1, 4165217.1,       6.0,     411.0,       0.0);
( 583920.2, 4165217.1,       6.2,     411.0,       0.0);
     ( 583927.3, 4165217.1,       6.5,     411.0,       0.0);
( 583934.4, 4165217.1,       6.7,     411.0,       0.0);
     ( 583941.5, 4165217.1,       6.9,     422.0,       0.0);
( 583948.6, 4165217.1,       7.2,     422.0,       0.0);
     ( 583955.7, 4165217.1,       7.4,     422.0,       0.0);
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( 583977.0, 4165217.1,       8.1,     422.0,       0.0);
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     ( 583891.8, 4165224.5,       6.0,     411.0,       0.0);
( 583898.9, 4165224.5,       6.0,     411.0,       0.0);
     ( 583906.0, 4165224.5,       6.0,     411.0,       0.0);
( 583913.1, 4165224.5,       6.0,     411.0,       0.0);
     ( 583920.2, 4165224.5,       6.2,     411.0,       0.0);
( 583927.3, 4165224.5,       6.5,     411.0,       0.0);
     ( 583934.4, 4165224.5,       6.7,     411.0,       0.0);
( 583941.5, 4165224.5,       6.9,     422.0,       0.0);
     ( 583948.6, 4165224.5,       7.2,     422.0,       0.0);
( 583955.7, 4165224.5,       7.4,     422.0,       0.0);
     ( 583962.8, 4165224.5,       7.6,     422.0,       0.0);
( 583969.9, 4165224.5,       7.9,     422.0,       0.0);
     ( 583977.0, 4165224.5,       8.1,     422.0,       0.0);
( 583984.1, 4165224.5,       8.4,     422.0,       0.0);
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    ( 583991.2, 4165224.5,        8.6,     422.0,        0.0);
( 583884.7, 4165231.8,        6.0,     411.0,        0.0);
```

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 *** AERMOD - VERSION  18081 ***   *** C:\Users\Brett Pomeroy
\Dropbox\Pomeroy Environmental Services\AERMOD ***
05/13/19
 *** AERMET - VERSION  14134 ***   ***
***        23:05:57

PAGE   6
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN

                                             *** DISCRETE
CARTESIAN RECEPTORS ***
                                           (X-COORD, Y-COORD,
ZELEV, ZHILL, ZFLAG)

(METERS)

     ( 583891.8, 4165231.8,       6.0,     411.0,       0.0);
( 583898.9, 4165231.8,       6.0,     411.0,       0.0);
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     ( 583920.2, 4165231.8,       6.2,     411.0,       0.0);
( 583927.3, 4165231.8,       6.5,     411.0,       0.0);
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( 583941.5, 4165246.5,       7.0,     422.0,       0.0);
     ( 583948.6, 4165246.5,       7.2,     422.0,       0.0);
( 583955.7, 4165246.5,       7.4,     422.0,       0.0);
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( 583969.9, 4165246.5,       7.9,     422.0,       0.0);
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     ( 583920.2, 4165253.8,       6.3,     422.0,       0.0);
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( 583941.5, 4165253.8,       7.2,     422.0,       0.0);
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     ( 583934.4, 4165261.2,       7.0,     422.0,       0.0);
( 583941.5, 4165261.2,       7.4,     422.0,       0.0);
     ( 583948.6, 4165261.2,       7.7,     422.0,       0.0);
( 583955.7, 4165261.2,       7.9,     422.0,       0.0);
     ( 583920.2, 4165268.5,       6.4,     422.0,       0.0);
( 583927.3, 4165268.5,       6.8,     422.0,       0.0);
     ( 583934.4, 4165268.5,       7.2,     422.0,       0.0);
( 583941.5, 4165268.5,       7.6,     422.0,       0.0);
     ( 583948.6, 4165268.5,       7.9,     422.0,       0.0);
( 583927.3, 4165275.8,       6.9,     422.0,       0.0);
     ( 583934.4, 4165275.8,       7.4,     422.0,       0.0);
( 583941.5, 4165275.8,       7.9,     422.0,       0.0);
     ( 583934.4, 4165283.2,       7.5,     422.0,       0.0);
```

```
 *** AERMOD - VERSION  18081 ***   *** C:\Users\Brett Pomeroy
\Dropbox\Pomeroy Environmental Services\AERMOD ***
05/13/19
 *** AERMET - VERSION  14134 ***   ***
***        23:05:57

PAGE   7
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN

                                            *** METEOROLOGICAL
DAYS SELECTED FOR PROCESSING ***
                                                               (1
=YES; 0=NO)

            1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1   1 1 1 1 1
1 1 1 1 1   1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1   1 1 1 1 1
1 1 1 1 1   1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1   1 1 1 1 1
1 1 1 1 1   1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1   1 1 1 1 1
1 1 1 1 1   1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1   1 1 1 1 1
1 1 1 1 1   1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1   1 1 1 1 1
1 1 1 1 1   1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1   1 1 1 1 1
1 1 1 1 1   1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1  1 1 1 1 1

                NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED
WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.



                                  *** UPPER BOUND OF FIRST
THROUGH FIFTH WIND SPEED CATEGORIES ***

(METERS/SEC)

                                                 1.54,   3.09,
5.14,   8.23,  10.80,
```

```
 *** AERMOD - VERSION  18081 ***   *** C:\Users\Brett Pomeroy
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 *** AERMET - VERSION  14134 ***   ***
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PAGE   8
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN

                                    *** UP TO THE FIRST 24 HOURS
OF METEOROLOGICAL DATA ***

   Surface file:   724930.SFC
Met Version:  14134
   Profile file:   724930.PFL
   Surface format: FREE
   Profile format: FREE
   Surface station no.:    23230                 Upper air
station no.:    23230
                  Name: OAKLAND/WSO_AP
Name: OAKLAND/WSO_AP
                  Year:   2009
Year:   2009

 First 24 hours of scalar data
 YR MO DY JDY HR     H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN
Z0  BOWEN ALBEDO  REF WS   WD     HT  REF TA     HT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 09 01 01   1 01  -17.2  0.303 -9.000 -9.000 -999.  401.    147.2
0.63   0.86   1.00    2.36   81.   10.0  282.5    2.0
 09 01 01   1 02  -21.8  0.383 -9.000 -9.000 -999.  569.    234.6
0.63   0.86   1.00    2.86   68.   10.0  282.0    2.0
 09 01 01   1 03  -26.3  0.460 -9.000 -9.000 -999.  749.    337.1
0.63   0.86   1.00    3.36   84.   10.0  280.9    2.0
 09 01 01   1 04  -15.4  0.270 -9.000 -9.000 -999.  368.    116.1
0.47   0.86   1.00    2.36   53.   10.0  280.9    2.0
 09 01 01   1 05  -26.3  0.460 -9.000 -9.000 -999.  749.    336.3
0.63   0.86   1.00    3.36   73.   10.0  280.4    2.0
 09 01 01   1 06  -21.9  0.383 -9.000 -9.000 -999.  573.    232.9
0.63   0.86   1.00    2.86   82.   10.0  280.4    2.0
 09 01 01   1 07  -22.0  0.383 -9.000 -9.000 -999.  569.    232.5
0.63   0.86   1.00    2.86   95.   10.0  279.9    2.0
 09 01 01   1 08  -11.2  0.196 -9.000 -9.000 -999.  238.     60.6
0.63   0.86   0.76    1.76   73.   10.0  279.9    2.0
 09 01 01   1 09   -2.2 -9.000 -9.000 -9.000 -999. -999. -99999.0
0.45   0.86   0.39    0.00    0.   10.0  280.4    2.0
 09 01 01   1 10    6.8  0.266  0.264  0.016   98.  329.   -250.8
0.63   0.86   0.27    1.76   91.   10.0  280.9    2.0
 09 01 01   1 11   15.5 -9.000 -9.000 -9.000  177. -999. -99999.0
0.45   0.86   0.22    0.00    0.   10.0  282.0    2.0
 09 01 01   1 12   96.1  0.393  1.019  0.014  401.  591.    -57.4
```

```
0.22   0.86   0.21    3.36  266.   10.0  281.4    2.0
 09 01 01   1 13  102.5  0.395  1.092  0.014  462.  595.    -54.4
0.22   0.86   0.20    3.36  283.   10.0  282.0    2.0
 09 01 01   1 14   89.9  0.297  1.066  0.015  489.  394.    -26.5
0.22   0.86   0.21    2.36  249.   10.0  282.0    2.0
 09 01 01   1 15   62.1  0.383  0.954  0.014  507.  569.    -82.1
0.22   0.86   0.24    3.36  242.   10.0  282.5    2.0
 09 01 01   1 16   23.1  0.665  0.690  0.006  513. 1300.  -1150.4
0.52   0.86   0.33    4.86  304.   10.0  282.5    2.0
 09 01 01   1 17  -37.0  0.486 -9.000 -9.000 -999.  846.    280.6
0.22   0.86   0.56    4.86  291.   10.0  281.4    2.0
 09 01 01   1 18  -52.2  0.480 -9.000 -9.000 -999.  799.    191.9
0.52   0.86   1.00    3.86  307.   10.0  280.9    2.0
 09 01 01   1 19  -25.6  0.224 -9.000 -9.000 -999.  327.     39.8
0.52   0.86   1.00    2.36  334.   10.0  280.4    2.0
 09 01 01   1 20  -11.1  0.119 -9.000 -9.000 -999.  115.     13.8
0.52   0.86   1.00    1.76  317.   10.0  280.4    2.0
 09 01 01   1 21  -10.3  0.119 -9.000 -9.000 -999.   98.     14.7
0.52   0.86   1.00    1.76  320.   10.0  280.4    2.0
 09 01 01   1 22 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0
0.45   0.86   1.00    0.00    0.   10.0  280.9    2.0
 09 01 01   1 23 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0
0.45   0.86   1.00    0.00    0.   10.0  281.4    2.0
 09 01 01   1 24 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0
0.45   0.86   1.00    0.00    0.   10.0  281.4    2.0


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW
sigmaV
 09 01 01 01   10.0 1   81.    2.36   282.6
99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
```

```
 *** AERMOD - VERSION  18081 ***   *** C:\Users\Brett Pomeroy
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 *** AERMET - VERSION  14134 ***   ***
***        23:05:57

PAGE   9
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN

                  *** THE ANNUAL AVERAGE CONCENTRATION    VALUES
AVERAGED OVER   5 YEARS FOR SOURCE GROUP: ALL      ***
                                  INCLUDING SOURCE(S):
L0000001    , L0000002    , L0000003    , L0000004    ,
L0000005    ,
                 L0000006    , L0000007    , L0000008    ,
L0000009    , L0000010    , L0000011    , L0000012    ,
L0000013    ,
                 L0000014    , L0000015    , L0000016    ,
L0000017    , L0000018    , L0000019    , L0000020    ,
L0000021    ,

                                             *** DISCRETE
CARTESIAN RECEPTOR POINTS ***

                                        ** CONC OF DPM      IN
MICROGRAMS/M**3                          **

       X-COORD (M)   Y-COORD (M)        CONC
X-COORD (M)   Y-COORD (M)        CONC
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
         583934.41    4165165.75        0.00320
583941.51    4165165.75        0.00340
         583927.31    4165173.09        0.00318
583934.41    4165173.09        0.00338
         583941.51    4165173.09        0.00360
583948.61    4165173.09        0.00384
         583920.21    4165180.43        0.00316
583927.31    4165180.43        0.00336
         583934.41    4165180.43        0.00358
583941.51    4165180.43        0.00382
         583948.61    4165180.43        0.00409
583955.71    4165180.43        0.00438
         583913.11    4165187.77        0.00314
583920.21    4165187.77        0.00334
         583927.31    4165187.77        0.00356
583934.41    4165187.77        0.00380
         583941.51    4165187.77        0.00407
583948.61    4165187.77        0.00436
         583955.71    4165187.77        0.00469
583962.81    4165187.77        0.00506
         583906.01    4165195.11        0.00312
```

583913.11	4165195.11	0.00331
583920.21	4165195.11	0.00353
583927.31	4165195.11	0.00378
583934.41	4165195.11	0.00404
583941.51	4165195.11	0.00434
583948.61	4165195.11	0.00468
583955.71	4165195.11	0.00505
583962.81	4165195.11	0.00547
583969.91	4165195.11	0.00596
583898.91	4165202.45	0.00309
583906.01	4165202.45	0.00329
583913.11	4165202.45	0.00350
583920.21	4165202.45	0.00375
583927.31	4165202.45	0.00402
583934.41	4165202.45	0.00432
583941.51	4165202.45	0.00465
583948.61	4165202.45	0.00503
583955.71	4165202.45	0.00546
583962.81	4165202.45	0.00595
583969.91	4165202.45	0.00652
583977.01	4165202.45	0.00720
583891.81	4165209.79	0.00307
583898.91	4165209.79	0.00326
583906.01	4165209.79	0.00348
583913.11	4165209.79	0.00371
583920.21	4165209.79	0.00398
583927.31	4165209.79	0.00428
583934.41	4165209.79	0.00462
583941.51	4165209.79	0.00500
583948.61	4165209.79	0.00543
583955.71	4165209.79	0.00592
583962.81	4165209.79	0.00650
583969.91	4165209.79	0.00718
583977.01	4165209.79	0.00800
583984.11	4165209.79	0.00900
583884.71	4165217.13	0.00303
583891.81	4165217.13	0.00323
583898.91	4165217.13	0.00345
583906.01	4165217.13	0.00368
583913.11	4165217.13	0.00394
583920.21	4165217.13	0.00424
583927.31	4165217.13	0.00458
583934.41	4165217.13	0.00496
583941.51	4165217.13	0.00539
583948.61	4165217.13	0.00589
583955.71	4165217.13	0.00647
583962.81	4165217.13	0.00715
583969.91	4165217.13	0.00797
583977.01	4165217.13	0.00897
583984.11	4165217.13	0.01022
583991.21	4165217.13	0.01186
583877.61	4165224.47	0.00300

583884.71	4165224.47	0.00320
583891.81	4165224.47	0.00341
583898.91	4165224.47	0.00365
583906.01	4165224.47	0.00391
583913.11	4165224.47	0.00420
583920.21	4165224.47	0.00454
583927.31	4165224.47	0.00492

```
 *** AERMOD - VERSION  18081 ***   *** C:\Users\Brett Pomeroy
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PAGE  10
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN

                   *** THE ANNUAL AVERAGE CONCENTRATION    VALUES
AVERAGED OVER   5 YEARS FOR SOURCE GROUP: ALL      ***
                                  INCLUDING SOURCE(S):
L0000001    , L0000002    , L0000003    , L0000004    ,
L0000005    ,
                 L0000006    , L0000007    , L0000008    ,
L0000009    , L0000010    , L0000011    , L0000012    ,
L0000013    ,
                 L0000014    , L0000015    , L0000016    ,
L0000017    , L0000018    , L0000019    , L0000020    ,
L0000021    ,

                                             *** DISCRETE
CARTESIAN RECEPTOR POINTS ***

                                        ** CONC OF DPM      IN
MICROGRAMS/M**3                          **

       X-COORD (M)   Y-COORD (M)        CONC
X-COORD (M)   Y-COORD (M)        CONC
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
         583934.41    4165224.47        0.00535
583941.51    4165224.47        0.00584
         583948.61    4165224.47        0.00642
583955.71    4165224.47        0.00710
         583962.81    4165224.47        0.00791
583969.91    4165224.47        0.00891
         583977.01    4165224.47        0.01015
583984.11    4165224.47        0.01179
         583991.21    4165224.47        0.01403
583884.71    4165231.81        0.00337
         583891.81    4165231.81        0.00361
583898.91    4165231.81        0.00387
         583906.01    4165231.81        0.00416
583913.11    4165231.81        0.00449
         583920.21    4165231.81        0.00487
583927.31    4165231.81        0.00530
         583934.41    4165231.81        0.00579
583941.51    4165231.81        0.00637
         583948.61    4165231.81        0.00704
583955.71    4165231.81        0.00785
         583962.81    4165231.81        0.00884
```

583969.91	4165231.81	0.01008
583977.01	4165231.81	0.01169
583984.11	4165231.81	0.01394
583891.81	4165239.15	0.00383
583898.91	4165239.15	0.00412
583906.01	4165239.15	0.00445
583913.11	4165239.15	0.00481
583920.21	4165239.15	0.00524
583927.31	4165239.15	0.00573
583934.41	4165239.15	0.00631
583941.51	4165239.15	0.00698
583948.61	4165239.15	0.00778
583955.71	4165239.15	0.00876
583962.81	4165239.15	0.01000
583969.91	4165239.15	0.01160
583977.01	4165239.15	0.01379
583898.91	4165246.49	0.00440
583906.01	4165246.49	0.00477
583913.11	4165246.49	0.00518
583920.21	4165246.49	0.00567
583927.31	4165246.49	0.00624
583934.41	4165246.49	0.00691
583941.51	4165246.49	0.00771
583948.61	4165246.49	0.00868
583955.71	4165246.49	0.00990
583962.81	4165246.49	0.01148
583969.91	4165246.49	0.01367
583906.01	4165253.83	0.00513
583913.11	4165253.83	0.00560
583920.21	4165253.83	0.00618
583927.31	4165253.83	0.00685
583934.41	4165253.83	0.00765
583941.51	4165253.83	0.00863
583948.61	4165253.83	0.00984
583955.71	4165253.83	0.01142
583962.81	4165253.83	0.01354
583913.11	4165261.17	0.00610
583920.21	4165261.17	0.00677
583927.31	4165261.17	0.00757
583934.41	4165261.17	0.00855
583941.51	4165261.17	0.00977
583948.61	4165261.17	0.01134
583955.71	4165261.17	0.01349
583920.21	4165268.51	0.00748
583927.31	4165268.51	0.00845
583934.41	4165268.51	0.00967
583941.51	4165268.51	0.01125
583948.61	4165268.51	0.01334
583927.31	4165275.85	0.00955
583934.41	4165275.85	0.01113
583941.51	4165275.85	0.01327
583934.41	4165283.19	0.01306

```
 *** AERMOD - VERSION  18081 ***   *** C:\Users\Brett Pomeroy
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05/13/19
 *** AERMET - VERSION  14134 ***   ***
***        23:05:57

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 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN


                                   *** THE SUMMARY OF MAXIMUM
ANNUAL RESULTS AVERAGED OVER   5 YEARS ***



                                    ** CONC OF DPM      IN
MICROGRAMS/M**3                          **


NETWORK
GROUP ID                       AVERAGE CONC
RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL       1ST HIGHEST VALUE IS       0.01403 AT (  583991.21,
4165224.47,     8.59,   422.00,    0.00)  DC
          2ND HIGHEST VALUE IS       0.01394 AT (  583984.11,
4165231.81,     8.36,   422.00,    0.00)  DC
          3RD HIGHEST VALUE IS       0.01379 AT (  583977.01,
4165239.15,     8.12,   422.00,    0.00)  DC
          4TH HIGHEST VALUE IS       0.01367 AT (  583969.91,
4165246.49,     7.89,   422.00,    0.00)  DC
          5TH HIGHEST VALUE IS       0.01354 AT (  583962.81,
4165253.83,     7.90,   422.00,    0.00)  DC
          6TH HIGHEST VALUE IS       0.01349 AT (  583955.71,
4165261.17,     7.91,   422.00,    0.00)  DC
          7TH HIGHEST VALUE IS       0.01334 AT (  583948.61,
4165268.51,     7.92,   422.00,    0.00)  DC
          8TH HIGHEST VALUE IS       0.01327 AT (  583941.51,
4165275.85,     7.87,   422.00,    0.00)  DC
          9TH HIGHEST VALUE IS       0.01306 AT (  583934.41,
4165283.19,     7.47,   422.00,    0.00)  DC
         10TH HIGHEST VALUE IS       0.01186 AT (  583991.21,
4165217.13,     8.59,   422.00,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

```
 *** AERMOD - VERSION  18081 ***   *** C:\Users\Brett Pomeroy
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05/13/19
 *** AERMET - VERSION  14134 ***   ***
***        23:05:57

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 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            1 Warning Message(s)
 A Total of         7953 Informational Message(s)

 A Total of        43872 Hours Were Processed

 A Total of         7152 Calm Hours Identified

 A Total of          801 Missing Hours Identified (  1.83
Percent)

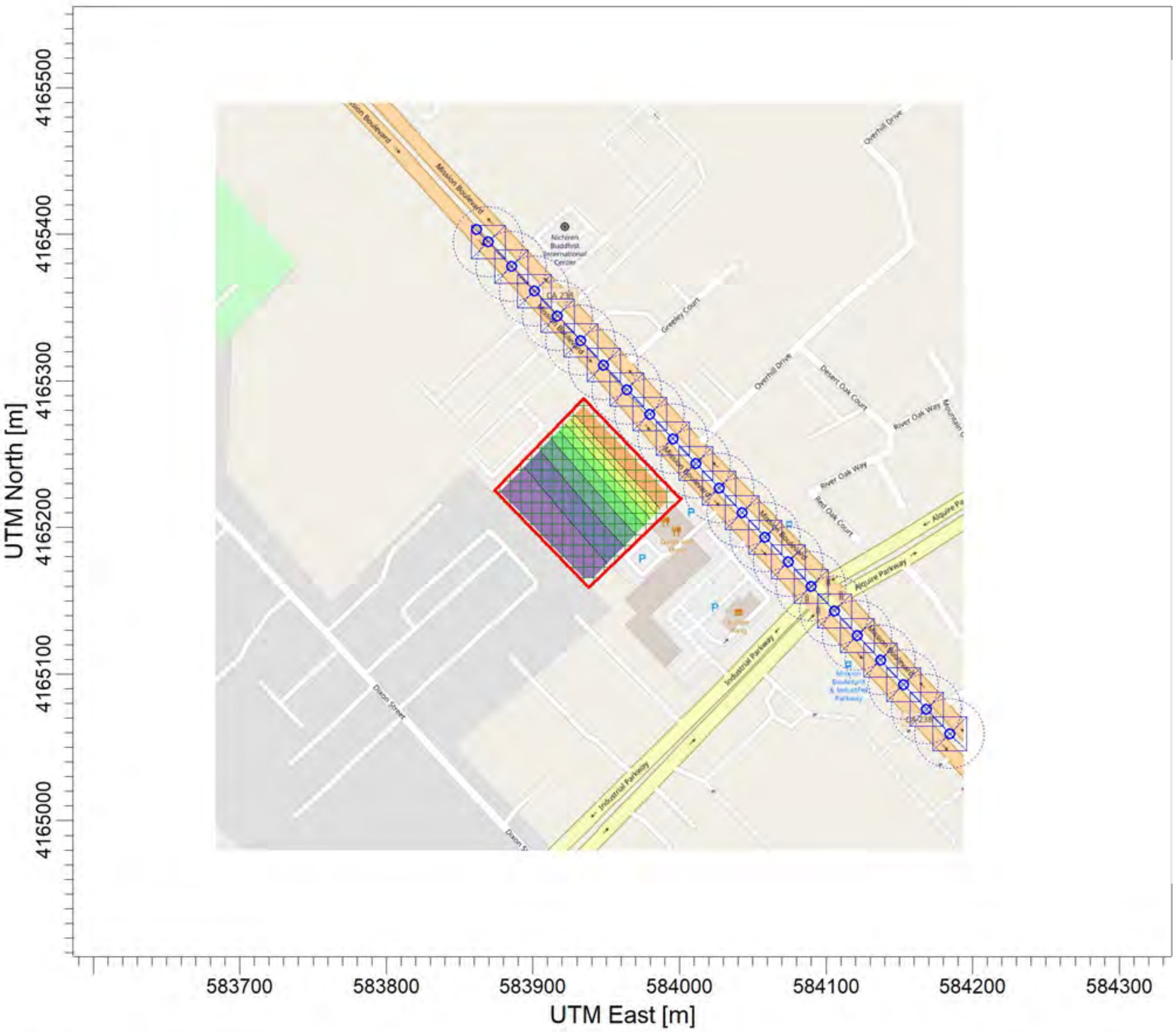

    ******** FATAL ERROR MESSAGES ********
               ***  NONE  ***


    ********   WARNING MESSAGES   ********
 MX W481   43873         MAIN: Data Remaining After End of Year.
Number of Hours=           48

    ************************************
    *** AERMOD Finishes Successfully ***
    ************************************
```

Attachment V

Mission-Hayward



PLOT FILE OF ANNUAL VALUES AVERAGED ACROSS 5 YEARS FOR SOURCE GROUP: ALL ug/m^3

Max: 1.4E-02 [ug/m^3] at (583991.21, 4165224.47)

3.0E-03	4.0E-03	5.0E-03	6.0E-03	7.0E-03	8.0E-03	9.0E-03	1.0E-02	1.4E-02

COMMENTS:

SOURCES:

1

RECEPTORS:

153

OUTPUT TYPE:

Concentration

SCALE: 1:4,714

0 0.1 km

POMEROY ENVIRONMENTAL SERVICES

MAX:

1.4E-02 ug/m^3

PROJECT NO.:

AERMOD View - Lakes Environmental Software

Appendix D

Cultural Resources Assessment

Rincon Consultants, Inc.

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August 27, 2019
Rincon Project No. 19-08255

Marcus Martinez, Associate Planner City of Hayward
777 B Street, 3rd Floor
Hayward, California 94541
email: marcus.martinez@hayward-ca.gov

Subject: Cultural Resources Assessment for the Proposed Hayward Mission Family Apartments Project

Dear Mr. Martinez:

Rincon Consultants, Inc. (Rincon) has conducted a cultural resources assessment of the proposed Hayward Mission Family Apartments Project in Hayward, California. The purpose of this technical memorandum is to document the results of the tasks performed by Rincon, specifically, a cultural resources records search, Native American outreach, and a pedestrian field survey of the project site. Rincon understands that the current project is subject to the California Environmental Quality Act (CEQA) with the City of Hayward serving as the lead agency.

Project Description

The proposed project site is a residential development in the City of Hayward, Alameda County. The project site would be approximately 2.21 acres in size and consists of three assessor's parcels (078C-0438-013-06, 078C-0438-014, and 078C-0438-015-02) located at 29497, 29547, and 29553 Mission Boulevard, approximately 0.5 mile from the South Hayward Bay Area Rapid Transit (BART) station. The project site is undeveloped and is bordered by Mission Boulevard to the northeast, commercial uses to the southeast and northwest, and residential units to the west.

The proposed project would involve the construction of a five-story, affordable family housing project with 140 rental units on a currently undeveloped site. The apartment complex would consist of 43 one-bedroom units, 55 two-bedroom units (including one two-bedroom manager's unit), and 42 three-bedroom units. Eleven of the 140 units would be provided as affordable units within the complex. The proposed building would be constructed in a u-shaped pattern with a landscaped area in the center of the complex. The proposed project would include an approximately 2,700 square-foot day care center with an 1,800 square foot secured exterior play area that would be located at the northern corner of the project site along Mission Boulevard. Additionally, approximately 1,800 square feet of retail space would be in a two-story attached building at the northern frontage of the project site along Mission Boulevard.

Along with large common areas and open space courtyards available to the residents, the proposed project would also include flexible community space suited to be adaptable to community needs, as well as providing for both temporary and permanent collective programmed spaces. The proposed project would also include a resident lounge, a secured bike room for 73 bikes, a bike repair station, and an almost 670 square foot community roof deck that would look out over Mission Boulevard.

Cultural Resources Records Search

The Northwest Information Center (NWIC) records search identified 10 cultural resources studies conducted within a 0.5-mile radius of the project site, none of which included the project site.

The NWIC records search identified 13 previously recorded cultural resources within a 0.5-mile radius of the project site, all located outside of the project site. The resources consist of residential homes constructed between 1915 and the mid-1950s and commercial structures constructed between 1935 and 1965. No archaeological resources have been recorded in the 0.5-mile radius of the project site.

Native American Scoping

On August 9, 2019, Rincon contacted the Native American Heritage Commission (NAHC) and requested a search of the Sacred Lands File (SLF). As of the date of this memorandum, the NAHC has not provided a response to the SLF search request.

Intensive Pedestrian Field Survey

Rincon Archaeologist Sydni Kitchel conducted an intensive pedestrian field survey of the project site on August 14, 2019. Ms. Kitchel walked 5- to 10-meter transects and examined exposed ground surface for artifacts (e.g., flaked stone tools, tool-making debris, stone milling tools, ceramics, fire-affected rock [FAR]), ecofacts (marine shell and bone), soil discoloration that might indicate the presence of a cultural midden, soil depressions, and features indicative of the former presence of structures or buildings (e.g., standing exterior walls, postholes, foundations) or historic debris (e.g., metal, glass, ceramics). Additionally, ground disturbances such as animal burrows and drainages were visually inspected.

Ground visibility within the project site was good (50-75%). Three fragments of fire-affected rock (FAR) were identified within the project site, however, no soil discoloration from a midden nor evidence of a hearth were observed. None of the fragments exhibited any use-wear or other evidence of human modification and were thus not recorded as cultural resources. Brick and concrete debris were also identified within the project site along with other building debris, primarily metal pipes and concrete block fragments. No diagnostic artifacts were identified at the project site.

Findings and Recommendations

Historical and Archaeological Resources

The cultural resources records search, Native American outreach, and pedestrian survey did not result in the identification of cultural resources within the project site. No archaeological resources have been identified within a 0.5-mile radius of the project site. Thus, Rincon does not recommend further cultural resources work for the project site. The following measure is recommended in the case of unanticipated discoveries during project construction. Rincon recommends an unanticipated discoveries measure in the case of accidental discoveries of cultural resources during the course of project execution. This measure is discussed in further detail below. With the implementation of this measure, Rincon recommends a finding of ***less than significant impact*** to historical and archaeological resources with mitigation under CEQA.

Unanticipated Discovery of Cultural Resources

If cultural resources are encountered during ground disturbing activities, work in the immediate area should be halted and an archaeologist meeting the Secretary of the Interior's Professional Qualification Standards for archaeology (NPS 1983) should be contacted immediately to evaluate the find. If necessary, the evaluation may require preparation of a treatment plan and testing for the California Register of Historical Resources (CRHR) eligibility. If the discovery proves to be significant under CEQA and cannot be avoided by the project, additional work, such as data recovery excavation, may be required to mitigate any significant impacts to historical resources.

Human Remains

The discovery of human remains is always a possibility during ground disturbing activities. If human remains are found, the State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. In the event of an unanticipated discovery of human remains, the County Coroner must be notified immediately. If the human remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission which will determine and notify a most likely descendant (MLD). The MLD shall complete the inspection of the site and provide recommendations for treatment to the landowner within 48 hours of being granted access. With adherence to existing regulations, impacts to human remains would be ***less than significant*** under CEQA.

Sincerely,
Rincon Consultants, Inc.

Hannah Haas

Hannah Haas, M.A., RPA
Archaeologist

Christopher Duran, M.A., RPA
Archaeological Resources Program Manager &
Principal Investigator

Attachment:
Figure 1 Project Site Map

References:

National Park Service (NPS)
1983 Archaeological and Historic Preservation: Secretary of the Interior's Standards and Guidelines. Electronic document, online at https://www.nps.gov/history/local-law/arch_stnds_0.htm, accessed May 17, 2017.

Appendix E

Geotechnical Report

Attachment V

ROCKRIDGE
GEOTECHNICAL

Prepared for **Meta Housing Corporation**

GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
META HOUSING
29497 MISSION BOULEVARD
HAYWARD, CALIFORNIA

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November 2, 2018
Project No. 18-1515

PROJECT 201806620 SPR
29497, 29547, & 29553
MISSION BLVD
1ST SUBMITTAL 12/19/2018

Attachment V

ROCKRIDGE
GEOTECHNICAL

November 2, 2018
Project No. 18-1515

Mr. Ross Ferrerra
Senior Project Manager
Meta Housing Corporation
11150 West Olympic Boulevard, Suite 620
Los Angeles, California 90064

Subject: Geotechnical Investigation Report
Proposed Residential Development
Meta Housing
29497 Mission Boulevard
Hayward, California

Dear Mr. Ferrerra,

We are pleased to present our geotechnical investigation report, dated November 2, 2018, for the proposed residential development to be constructed at 29497 Mission Boulevard in Hayward, California. Our services were provided in accordance with our proposal, dated April 16, 2018.

The site consists of a 2.2-acre, rectangular-shaped vacant lot with plan dimensions of approximately 298 by 310 feet. The lot slopes gently down to the southwest with roughly six feet of elevation change across the site. We understand the proposed development will include a five-story, wood-framed residential building, which will be constructed near existing site grade. The proposed new building will be U-shaped with a courtyard and play structure at the center of the site, and will be surrounded by parking along the northwestern, southwestern, and southeastern perimeters of the site.

On the basis of the results of our geotechnical investigation, we conclude the site can be developed as planned, provided the recommendations presented in the attached report are incorporated into the project plans and specification and implemented during construction. The primary geotechnical concerns at the site are: (1) the presence of highly expansive near-surface soil, and (2) providing adequate vertical and lateral support for the proposed improvements.

We conclude the proposed new building may be supported on individual spread footings, provided the estimated static and seismically induced settlements are acceptable from a structural standpoint. The perimeter footings should be deepened to act as barriers to

Attachment V

reduce the potential for moisture change beneath the slab-on-grade floors. Alternatively, the proposed building may be supported on a P-T slab or a stiffened mat foundation. Recommendations for design of spread/continuous footings and a P-T slab are presented in Section 7.2 of this report. We can provide recommendations for a mat foundation upon request.

The recommendations contained in our report are based on a limited subsurface investigation and laboratory testing programs. Consequently, variations between expected and actual subsurface conditions may be found in localized areas during construction. Therefore, we should be engaged to observe grading and foundation installation during which time we may make changes in our recommendations, if deemed necessary.

We appreciate the opportunity to provide our services to you on this project. If you have any questions, please call.

Sincerely,
ROCKRIDGE GEOTECHNICAL, INC.

REGISTERED PROFESSIONAL ENGINEER
TESSA E. WILLIAMS
C 84312
EXP. 9/30/19
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
CRAIG S. SHIELDS
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GEOTECHNICAL
STATE OF CALIFORNIA

Tessa E. Williams, P.E.
Project Engineer

Craig S. Shields, P.E., G.E.
Principal Geotechnical Engineer

Enclosure

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Figure A-4 Classification Chart

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Corrosion Test Results

ROCKRIDGE
GEOTECHNICAL

GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
META HOUSING
29497 MISSION BOULEVARD
Hayward, California

1.0 INTRODUCTION

This report presents the results of the geotechnical investigation performed by Rockridge Geotechnical, Inc. for the proposed residential development to be constructed at 29497 Mission Boulevard in Hayward, California. The project site is located on the southwestern side of Mission Boulevard northwest of its intersection with Industrial Parkway, as shown on the Site Location Map, Figure 1.

The site consists of a 2.2-acre, rectangular-shaped vacant lot with plan dimensions of approximately 298 by 310 feet. The lot slopes gently down to the southwest with roughly six feet of elevation change across the site. We understand the proposed development will include a five-story, wood-framed residential building, which will be constructed near existing site grade. The proposed new building will be U-shaped with a courtyard and play structure at the center of the site, and will be surrounded by parking along the northwestern, southwestern, and southeastern perimeters of the site. Structural loads were not available for the proposed building at the time we prepared this report. We anticipate the loads will be relatively light as is typical for this type of structure.

2.0 SCOPE OF SERVICES

Our geotechnical investigation was performed in accordance with our proposal dated April 16, 2018. Our scope of work consisted of exploring subsurface conditions at the site by drilling three test borings, advancing three cone penetration tests (CPTs), performing laboratory testing on selected soil samples, and performing engineering analyses to develop conclusions and recommendations regarding:

- site seismicity and seismic hazards, including the potential for liquefaction and lateral spreading, and total and differential settlement resulting from liquefaction and/or cyclic densification
- the most appropriate foundation type(s) for the proposed structures
- design criteria for the recommended foundation type(s), including vertical and lateral capacities for each of the foundation type(s)
- estimates of foundation settlement
- site grading and excavation, including criteria for fill quality and compaction
- subgrade preparation for interior and exterior concrete slabs-on-grade
- flexible (asphalt concrete) and rigid (Portland cement concrete) pavement sections
- 2016 California Building Code (CBC) site class and design spectral response acceleration parameters
- corrosivity of the near-surface soil and the potential effects on buried concrete and metal structures and foundations
- construction considerations.

3.0 FIELD INVESTIGATION AND LABORATORY TESTING

Our field investigation consisted of drilling three test borings, advancing three CPTs, and performing laboratory testing on selected soil samples. Prior to advancing the test borings and CPTs, we obtained a drilling permit from the Alameda County Public Works Agency (ACPWA) and contacted Underground Service Alert (USA) to notify them of our work, as required by law. Details of the field investigation and laboratory testing are described below.

3.1 Test Borings

The test borings, designated B-1 through B-3, were drilled on June 18, 2018 by Benevent Building of Concord, California at the approximate locations shown on Figure 2. The borings were drilled to depths ranging from 26-1/2 to 31-1/2 feet bgs using a portable drill rig equipped with four-inch-diameter solid-stem flight augers. During drilling, our field engineer logged the soil encountered and obtained representative samples for visual classification and laboratory testing. The logs of the borings are presented on Figures A-1 through A-3 in Appendix A. The soil encountered in the borings was classified in accordance with the classification chart shown on Figure A-4.

Soil samples were obtained using the following samplers:

- Sprague and Henwood (S&H) split-barrel sampler with a 3.0-inch outside diameter and 2.5-inch inside diameter, lined with 2.43-inch inside diameter brass/stainless steel tubes.
- Standard Penetration Test (SPT) split-barrel sampler with a 2.0-inch outside and 1.5-inch inside diameter, without liners.

The samplers were driven with a 140-pound safety hammer falling about 30 inches per drop using a rope-and-cathead pulley system. The samplers were driven up to 18 inches and the hammer blows required to drive the samplers were recorded every six inches and are presented on the boring logs. A "blow count" is defined as the number of hammer blows per six inches of penetration or 50 blows for six inches or less of penetration. The blow counts used for this conversion were: (1) the last two blow counts if the sampler was driven more than 12 inches, (2) the last one blow count if the sampler was driven more than six inches but less than 12 inches, and (3) the only blow count if the sampler was driven six inches or less. The blow counts required to drive the S&H and SPT samplers were converted to approximate SPT N-values using factors of 0.7 and 1.2, respectively, to account for sampler type and approximate hammer energy. The converted SPT N-values are presented on the boring logs.

Upon completion, the boreholes were backfilled with neat cement grout in accordance with ACPWA grouting guidelines. The soil cuttings generated by the borings were placed on the ground next to each boring location.

3.2 Cone Penetration Tests

Our subsurface investigation also included performing three CPTs, designated as CPT-1 through CPT-3, on June 14, 2018, at the approximate locations shown on Figure 2. The CPTs were each advanced to a depth of about 50 feet bgs, by Middle Earth Geo Testing, Inc. of Orange, California. The CPTs were performed by hydraulically pushing a 1.4-inch-diameter cone-tipped probe with a projected area of 10 square centimeters into the ground. The cone-tipped probe measured tip resistance and the friction sleeve behind the cone tip measured frictional resistance. Electrical strain gauges within the cone continuously measured soil parameters for the entire depth advanced. Soil data, including tip resistance and frictional resistance, were recorded by a computer while the test was conducted. Accumulated data were processed by computer to provide engineering information such as the soil behavior types and approximate strength characteristics of the soil encountered. The CPT logs showing tip resistance and friction ratio, as well as interpreted soil behavior type, are presented in Appendix A on Figures A-5 through A-7.

3.3 Laboratory Testing

We re-examined each soil sample obtained from our borings to confirm the field classifications and select representative samples for laboratory testing. Soil samples were tested to measure moisture content, dry density, Atterberg limits, grain size distribution, resistance value (R-value), and corrosivity. The results of the laboratory tests are presented on the boring logs and in Appendix B.

4.0 SUBSURFACE CONDITIONS

Regional geologic information (Figure 3) indicates the site is underlain by Pleistocene-age alluvium (Qpa). Our borings and CPTs indicate the site is blanketed by about 2 to 3 feet of fill consisting of stiff to very stiff clay and medium dense to dense clayey sand with variable amounts of gravel. The fill is underlain by stiff to very stiff native clay with varying amounts of sand and gravel to the maximum depth explored of about 50 feet bgs. Laboratory tests indicate the near-surface clay has high to very high plasticity and expansion potential[1]. Expansive clay is subject to volume changes with changes in moisture content.

Groundwater was encountered in each of our borings at a depth of about 9 feet bgs. It should be noted the groundwater level was likely not given adequate time to stabilize at the time the measurements were taken. The depth to groundwater was also estimated using pore pressure dissipation test data from CPT-1 at a depth of approximately 6.8 feet bgs. The California Geological Survey (CGS) Seismic Hazard Zone Reports for the Hayward Quadrangle present a historic high water level on the order of 10 feet bgs within the site vicinity. The groundwater level at the site is expected to fluctuate several feet seasonally with potentially larger fluctuations annually, depending on the amount of rainfall.

Based on the available groundwater measurements, we conclude a design high groundwater depth of about seven feet bgs should be used for the subject site.

5.0 SEISMIC CONSIDERATIONS

Because the project site is in a seismically active region, we evaluated the potential for earthquake-induced geologic hazards, including ground shaking, ground surface rupture, liquefaction[2], lateral spreading[3] and cyclic densification.[4] The results of our evaluation regarding seismic considerations for the project site are presented in the following sections.

---

[1] Expansive soil undergoes large volume changes with changes in moisture content (i.e. it shrinks when dried and swells when wetted.

[2] Liquefaction is a phenomenon where loose, saturated, cohesionless soil experiences temporary reduction in strength during cyclic loading such as that produced by earthquakes.

[3] Lateral spreading is a phenomenon in which surficial soil displaces along a shear zone that has formed within an underlying liquefied layer. Upon reaching mobilization, the surficial blocks are transported downslope or in the direction of a free face by earthquake and gravitational forces.

[4] Cyclic densification is a phenomenon in which non-saturated, cohesionless soil is compacted by earthquake vibrations, causing ground-surface settlement.

5.1 Regional Seismicity and Faulting

The site is located in the Coast Ranges geomorphic province that is characterized by northwest-southeast trending valleys and ridges. These are controlled by folds and faults that resulted from the collision of the Farallon and North American plates and subsequent shearing along the San Andreas fault system. Movements along this plate boundary in the Northern California region occur along right-lateral strike-slip faults of the San Andreas Fault system.

The major active faults in the area are the Hayward and Calaveras faults. These faults and other known Quaternary-aged faults that are believed to be sources of major earthquakes (i.e., Magnitude>6.0) in the region are shown on Figure 4 as accessed from the U.S. Geological Survey (USGS) database (USGS, 2010). Known faults within a 50-kilometer radius of the site, the distance from the site and estimated mean characteristic Moment magnitude[5] [Working Group on California Earthquake Probabilities (WGCEP, 2008) and Cao et al. (2003)] are summarized in Table 1.

---

[5] Moment magnitude is an energy-based scale and provides a physically meaningful measure of the size of a faulting event. Moment magnitude is directly related to average slip and fault rupture area.

TABLE 1
Regional Faults and Seismicity

Fault Segment	Approximate Distance from Site (km)	Direction from Site	Mean Characteristic Moment Magnitude
Total Hayward	1.0	Northeast	7.00
Total Hayward-Rodgers Creek	1.0	Northeast	7.33
Total Calaveras	12	East	7.03
Mount Diablo Thrust	21	Northeast	6.70
Monte Vista-Shannon	28	Southwest	6.50
N. San Andreas - Peninsula	29	West	7.23
N. San Andreas (1906 event)	29	West	8.05
Green Valley Connected	30	North	6.80
Greenville Connected	31	Northeast	7.00
San Gregorio Connected	42	West	7.50
Great Valley 5, Pittsburg Kirby Hills	47	Northeast	6.70
Great Valley 7	48	East	6.90
N. San Andreas - North Coast	49	West	7.51

In the past 200 years, four major earthquakes (i.e., Magnitude > 6) have been recorded on the San Andreas Fault. In 1836, an earthquake with an estimated maximum intensity of VII on the Modified Mercalli (MM) Intensity Scale occurred east of Monterey Bay on the San Andreas Fault (Toppozada and Borchardt 1998). The estimated moment magnitude, M_w, for this earthquake is about 6.25. In 1838, an earthquake occurred on the Peninsula segment of the San Andreas Fault. Severe shaking occurred with an MM of about VIII-IX, corresponding to an M_w of about 7.5. The San Francisco Earthquake of 1906 caused the most significant damage in the history of the Bay Area in terms of loss of lives and property damage. This earthquake created a surface rupture along the San Andreas Fault from Shelter Cove to San Juan Bautista approximately 470 kilometers in length. It had a maximum intensity of XI (MM), an M_w of about 7.9, and was felt 560 kilometers away in Oregon, Nevada, and Los Angeles. The Loma Prieta Earthquake occurred on October 17, 1989 with an M_w of 6.9 in the Santa Cruz Mountains, which is about 68 kilometers southwest of this site.

In 1868, an earthquake with an estimated maximum intensity of X on the MM scale occurred on the southern segment (between San Leandro and Fremont) of the Hayward Fault. The estimated M_w for the earthquake is 7.0. In 1861, an earthquake of unknown magnitude (probably an M_w of about 6.5) was reported on the Calaveras Fault. The most recent significant earthquake on this fault was the 1984 Morgan Hill earthquake ($M_w = 6.2$).

On August 24, 2014 an earthquake with an estimated maximum intensity of VIII (severe) on the MM scale occurred on the West Napa fault. This earthquake was the largest earthquake event in the San Francisco Bay Area since the Loma Prieta Earthquake. The M_w of the 2014 South Napa Earthquake was 6.0.

The U.S. Geological Survey's 2014 Working Group on California Earthquake Probabilities has compiled the earthquake fault research for the San Francisco Bay area in order to estimate the probability of fault segment rupture. They have determined that the overall probability of moment magnitude 6.7 or greater earthquake occurring in the San Francisco Region during the next 30 years (starting from 2014) is 72 percent. The highest probabilities are assigned to the Hayward Fault, Calaveras Fault, and the northern segment of the San Andreas Fault. These probabilities are 14.3, 7.4, and 6.4 percent, respectively.

5.2 Geologic Hazards

Because the project site is in a seismically active region, we evaluated the potential for earthquake-induced geologic hazards including ground shaking, ground surface rupture, liquefaction,[6] lateral spreading,[7] and cyclic densification[8]. We used the results of our field investigation to evaluate the potential of these phenomena occurring at the project site.

5.2.1 Ground Shaking

The ground shaking intensity felt at the project site will depend on: 1) the size of the earthquake (magnitude), 2) the distance from the site to the fault source, 3) the directivity (focusing of earthquake energy along the fault in the direction of the rupture), and 4) site-specific soil conditions. The site is about one kilometer from a segment of the Hayward Fault. Therefore, the potential exists for a large earthquake to induce strong to very strong ground shaking at the site during the life of the project.

5.2.2 Ground Surface Rupture

Historically, ground surface displacements closely follow the trace of geologically young faults. The site is not within an Earthquake Fault Zone, as defined by the Alquist-Priolo Earthquake Fault Zoning Act, and no known active or potentially active faults exist on the site. We therefore conclude the risk of fault offset at the site from a known active fault is very low. In a seismically active area, the remote possibility exists for future faulting in areas where no faults previously existed; however, we conclude the risk of surface faulting and consequent secondary ground failure from previously unknown faults is also very low.

---

[6] Liquefaction is a phenomenon where loose, saturated, cohesionless soil experiences temporary reduction in strength during cyclic loading such as that produced by earthquakes.

[7] Lateral spreading is a phenomenon in which surficial soil displaces along a shear zone that has formed within an underlying liquefied layer. Upon reaching mobilization, the surficial blocks are transported downslope or in the direction of a free face by earthquake and gravitational forces.

[8] Cyclic densification is a phenomenon in which non-saturated, cohesionless soil is compacted by earthquake vibrations, causing ground-surface settlement.

5.2.3 Liquefaction and Associated Hazards

When a saturated, cohesionless soil liquefies, it experiences a temporary loss of shear strength created by a transient rise in excess pore pressure generated by strong ground motion. Soil susceptible to liquefaction includes loose to medium dense sand and gravel, low-plasticity silt, and some low-plasticity clay deposits. Flow failure, lateral spreading, differential settlement, loss of bearing strength, ground fissures and sand boils are evidence of excess pore pressure generation and liquefaction.

The site is located just outside a zone of liquefaction potential as shown on the map titled *State of California Seismic Hazard Zones, Hayward Quadrangle, Official Map*, prepared by the California Geological Survey (CGS), dated July 2, 2003 (see Figure 5). CGS has provided recommendations for procedures and report content for site investigations performed within seismic hazard zones in Special Publication 117 (SP-117), titled *Guidelines for Evaluating and Mitigating Seismic Hazard Zones in California*, dated September 11, 2008. SP-117 recommends subsurface investigations in mapped liquefaction hazard zones be performed using rotary-wash borings and/or CPTs.

Liquefaction susceptibility was assessed using the software CLiq v2.2.1.14 (GeoLogismiki, 2016). CLiq uses measured field CPT data and assesses liquefaction potential given a user-defined earthquake magnitude and peak ground acceleration (PGA). Our liquefaction analyses were performed using the methodology proposed by Boulanger and Idriss (2014). We also used the relationship proposed by Zhang, Robertson, and Brachman (2002) to estimate post-liquefaction volumetric strains and corresponding ground surface settlement; a relationship that is an extension of the work by Ishihara and Yoshimine (1992).

Our analyses were performed using the approximate in-situ groundwater depths measured in our CPTs and a "during earthquake" groundwater depth of seven feet bgs. In accordance with the 2016 CBC, we used a peak ground acceleration of 0.93 times gravity (g) in our liquefaction evaluation; this peak ground acceleration is consistent with the Maximum Considered Earthquake Geometric Mean (MCE_G) peak ground acceleration adjusted for site effects (PGA_M).

We also used a moment magnitude 7.33 earthquake, which is consistent with the mean characteristic moment magnitude for the Hayward Fault, as presented in Table 1.

Our liquefaction analyses indicate there are thin layers of potentially liquefiable soil between depths of approximately 8 and 32 feet bgs. The localized potentially liquefiable layers the site are generally less than two feet thick and a majority of the material identified as potentially liquefiable in the liquefaction analyses generally consists of silty and sandy clay. We estimate total ground settlement resulting from post-earthquake reconsolidation following a MCE event with PGA_M of 0.93g will be on the order of about 1/2 inch.

Our analysis and laboratory test results indicate the potentially liquefiable layers are sufficiently thin and/or have a sufficient amount of plastic fines such that the potential for surface manifestations from liquefaction, such as sand boils, and loss of bearing capacity for shallow foundations are low.

Lateral spreading occurs when a continuous layer of soil liquefies at depth and the soil layers above move toward an unsupported face, such as a shoreline slope, or in the direction of a regional slope or gradient. Based on the lack of controlling boundary conditions, we conclude the potential for lateral spreading to occur at the project site is very low.

5.2.4 Cyclic Densification

Cyclic densification (also referred to as differential compaction) of non-saturated sand (sand above groundwater table) can occur during an earthquake, resulting in settlement of the ground surface and overlying improvements. We used the CPT and boring data to evaluate the potential for settlement due to cyclic densification within the soil above the water table. The results of our investigation indicate the soil encountered above the groundwater table has sufficient cohesion and/or density, such that the potential for cyclic densification to occur at the site is low.

6.0 DISCUSSION AND CONCLUSIONS

From a geotechnical standpoint, we conclude the site can be developed as planned, provided the recommendations presented in this report are incorporated into the project plans and specifications and implemented during construction. The primary geotechnical concerns at the site are: (1) the presence of highly expansive near-surface soil, and (2) providing adequate vertical and lateral support for the proposed improvements. These issues are discussed in more detail below.

6.1 Expansive Soil

Atterberg limits tests performed on samples of the existing near-surface clay indicate the clay has high to very high plasticity and expansion potential. Highly expansive near-surface soil is subject to large volume changes during fluctuations in moisture content. These volume changes can cause movement and cracking of foundations, pavements, slabs, and below-grade walls. Therefore, foundations, pavements, and slabs should be designed and constructed to resist the effects of the expansive soil. In general, the effects of expansive soil can be mitigated by moisture-conditioning the expansive soil, providing select, non-expansive fill or lime-treated soil below interior and exterior slabs, and either supporting foundations below the zone of severe moisture change or by providing a stiff, shallow foundation that can limit deformation of the structure as the underlying soil shrinks and swells.

To prevent the soil subgrade beneath the building slab-on-grade from drying during construction and to reduce the long-term effects of expansive subgrade soil, a minimum of 18 inches of imported non-expansive fill should be placed on the prepared subgrade. Alternatively, the upper 18 inches of slab subgrade may be treated in place with lime to reduce its expansion potential. If a post-tensioned (P-T) slab-on-grade is used in lieu of footings, the P-T slab should be underlain by at least 18 inches of imported non-expansive fill or lime-treated on-site soil.

6.2 Foundation Support

The soil encountered at the foundation level has moderate strength and moderate compressibility. Therefore, we conclude the proposed building may be supported on individual spread footings, provided the estimated static and seismically induced settlements are acceptable from a structural standpoint. The perimeter footings should be deepened to act as barriers to reduce the potential for moisture change beneath the slab-on-grade floors.

As an alternative to deepened spread footings, the proposed building may be supported on a P-T slab or a stiffened mat foundation. Recommendations for design of spread/continuous footings and a P-T slab are presented in Section 7.2 of this report. We can provide recommendations for a mat foundation upon request.

Our settlement analyses indicate total settlement of a shallow foundation system (i.e., footings, P-T slab, or mat) under static load conditions, designed using the allowable bearing pressures presented below in Section 7.2, will be on the order of approximately 3/4 inch and differential settlement will be on the order of about 1/2 inch over a 30-foot horizontal distance. Shallow foundations may experience an additional 1/2 inch of total settlement and 1/4 inch of differential settlement over a 30-foot horizontal distance due to post-liquefaction reconsolidation following a major earthquake, as discussed in Section 5.2.

6.3 Construction Considerations

The soil to be excavated generally consists of clay with varying sand content, which can be excavated with conventional earth-moving equipment such as loaders and backhoes. If site grading is performed during the rainy season, repeated loads by heavy equipment will reduce the strength of the surficial soil and decrease its ability to resist deformation; this phenomenon could result in severe rutting and pumping of the exposed subgrade. To reduce the potential for this behavior, heavy rubber-tired equipment as well as vibratory rollers, should be avoided.

Excavations that will be deeper than five feet and will be entered by workers should be sloped or shored in accordance with CAL-OSHA standards (29 CFR Part 1926). The contractor should be responsible for the construction and safety of temporary slopes. We judge temporary slopes with a maximum inclination of 1:1 (horizontal to vertical) should be stable above the groundwater level, provided the slope is not surcharged by adjacent structures, construction equipment, or stockpiled soil. Excavations below the groundwater level should be sloped at an inclination of 1.5:1 (horizontal:vertical) in accordance with CAL-OSHA requirements for Type C soils.

6.4 Soil Corrosivity

Corrosivity testing was performed by Project X Corrosion Engineering of Murrieta, California on a near-surface soil sample obtained from Boring B-3 at a depth of approximately 2 feet bgs. The results of the corrosivity test results are presented in Appendix B.

Based on the resistivity test results, which indicate a minimum resistivity of 938 ohm-centimeters, we conclude the near-surface soil should be considered as "highly corrosive" to buried metals. Accordingly, all buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric-coated steel or iron should be protected against corrosion depending upon the critical nature of the structure. If it is necessary to have metal in contact with soil, a corrosion engineer should be consulted to provide recommendations for corrosion protection. The test results indicate that sulfate and chloride concentrations are insufficient to damage reinforced concrete structures below ground, and the pH of the soil does not present a problem with buried iron, steel, mortar-coated steel, and reinforced concrete.

7.0 RECOMMENDATIONS

Recommendations for site grading, foundation design, and seismic design are presented in this section of the report.

7.1 Site Preparation and Grading

Site clearing should include the removal of all existing pavements, underground utilities, and buried foundations, if any. In general, abandoned underground utilities should be removed to the property line or service connections and properly capped or plugged with concrete. Where existing utility lines are outside of the proposed building footprint and will not interfere with the proposed construction, they may be abandoned in-place provided the lines are filled with lean concrete or cement grout to the property line. Voids resulting from demolition activities should be properly backfilled with compacted fill under the observation of our field engineer following the recommendations provided later in this section. Any vegetation and organic topsoil (if present) should be stripped in areas to receive improvements (i.e., building, pavement, or flatwork). Tree roots with a diameter greater than 1/2 inch within three feet of subgrade should be removed.

The soil exposed by stripping or excavation should be scarified to a depth of at least 12 inches, moisture-conditioned to at least four percent above optimum moisture content, and compacted to between 87 and 92 percent relative compaction[9]. The building pad subgrade (i.e., bottom of capillary break for slab-on-grade floor or bottom of P-T slab) should be graded to accommodate either 18 inches of non-expansive soil consisting of imported select fill or lime-treated on-site soil.

On-site soil may be used as general fill, provided the material is free of organic matter, contain no rocks or lumps larger than three inches in greatest dimension, and be approved by the Geotechnical Engineer. If material to be used as fill is imported to the site, it should meet the requirements for select fill provided below in Section 7.1.1. A summary of the moisture and compaction requirements for the various types of fill that may be used at the site is presented in Table 2.

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[9] Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density of the same material, as determined by the ASTM D1557 laboratory compaction procedure.

TABLE 2
Summary of Compaction Requirements

Location	Required Relative Compaction (percent)	Moisture Requirement
Building pad subgrade – native high-plasticity clay	87 – 92	4+% above optimum
General fill – lime-treated clay and low-plasticity on-site and imported	90+	Above optimum
General fill – native high-plasticity clay	87 – 92	4+% above optimum
Utility trench backfill – native high-plasticity clay	87 – 92	4+% above optimum
Utility trench backfill – low-plasticity	90+	Above optimum
Utility trench - clean sand or gravel	95+	Near optimum
Pavement subgrade – native high-plasticity clay	90+	2+% above optimum
Pavement subgrade – low-plasticity	95+	Above optimum
Pavement - aggregate base	95+	Near optimum
Exterior slabs – native high-plasticity clay	87 – 92	4+% above optimum
Exterior slabs – low-plasticity	90+	Above optimum
Exterior slabs – select fill	90+	Above optimum

Where the above recommended compaction requirements are in conflict with the City of Hayward standard details for pavements and sidewalks within the public right-of-way, the City Engineer or inspector should determine which compaction requirements should take precedence.

If grading work is performed during the rainy season, the contractor may find the subgrade material too wet to compact to the recommended relative compaction. If so, the subgrade will have to be scarified and aerated to lower its moisture content so the specified compaction can be achieved. Material to be dried by aeration should be scarified to a depth of at least 12 inches; the scarified soil should be turned at least twice a day to promote uniform drying. Once the moisture content of the aerated soil has been reduced to acceptable levels, the soil should be compacted in accordance with our recommendations presented in Table 2. Aeration typically is the least costly method used to stabilize the subgrade soil; however, it generally requires the most time to complete. Other soil stabilization alternatives include overexcavating and placing drier material, and lime treatment.

It is also important that the moisture content of subgrade soil is sufficiently high to reduce the expansion potential. If the grading work is performed during the dry season, moisture-conditioning may be required.

7.1.1 Select Fill

Select fill should consist of imported soil that is free of organic matter, contain no rocks or lumps larger than three inches in greatest dimension, have a liquid limit less than 40 and plasticity index less than 12, and be approved by the Geotechnical Engineer. Select fill should be placed in lifts not exceeding eight inches in loose thickness, moisture-conditioned to near optimum moisture content, and compacted to at least 90 percent relative compaction beneath floor slabs, concrete flatwork and sidewalks. Beneath vehicular pavements, the select fill should be compacted to at least 95 percent relative compaction. Samples of proposed select fill material should be submitted to the Geotechnical Engineer at least three business days prior to use at the site.

The grading contractor should provide analytical test results or other suitable environmental documentation indicating the imported fill is free of hazardous materials at least three days before use at the site. If this data is not provided, a minimum of two weeks will be required to perform any necessary analytical testing.

7.1.2 Lime-Treated Soil

Lime treatment of fine-grained soils generally includes site preparation, application of lime, mixing, compaction, and curing of the lime-treated soil. Field quality control measures should include checking the depth of lime treatment, degree of pulverization, lime spread rate measurement, lime content measurement, and moisture content and density measurements, and mixing efficiency.

The lime treatment process should be designed by a contractor specializing in its use and who is experienced in the application of lime in similar soil conditions. Based on our experience with lime treatment, we judge that the specialty contractor should be able to treat the highly expansive on-site material to produce a non-expansive fill beneath building slabs, mat foundations, and exterior concrete flatwork. For planning purposes, we recommend assuming the lime treatment will consist of at least five percent of dolomitic quicklime by dry weight of soil. An average dry unit weight of 105 pounds per cubic foot (pcf) should be assumed for design purposes. The specialty contractor performing the lime treatment should: 1) perform a lime demand test prior to treatment to determine the percentage of Quicklime required to achieve a pH of 12.4 or higher in the treated soil, 2) perform an Atterberg limits test to confirm the proposed percentage of Quicklime will reduce the plasticity index of the treated soil to 12 or less, and 3) prepare a lime treatment procedure for our review prior to construction.

Prior to lime treatment, we recommend the site be graded to a level pad elevation in accordance with our previous recommendations and all below-grade obstructions be removed. The soil treated with lime should be mixed and compacted in one lift. The lime should be thoroughly blended with the soil and allowed to cure for 24 hours prior to remixing and compaction. The lime-treated soil should be moisture-conditioned to above optimum moisture content and compacted to at least 90 percent relative compaction. It should be noted that disposal of lime-treated soil is typically expensive because of the high pH of the treated soil. In addition, lime-treated soil should be completely removed from landscaping areas.

7.1.3 Exterior Flatwork Subgrade Preparation

We recommend a minimum of 12 inches of imported (select) material be placed beneath proposed exterior concrete flatwork, including patio slabs and sidewalks. Select fill beneath exterior slabs-on-grade, such as patios and sidewalks, should be moisture-conditioned and compacted in accordance with the requirements provided above in Table 2. Lime treatment of the upper 12 inches of on-site soil may be used in lieu of placement of select fill.

Even with 12 inches of select fill or lime-treated soil, exterior slabs may experience some cracking due to shrinking and swelling of the underlying expansive soil. Thickening the slab edges and adding additional reinforcement will control this cracking to some degree. In addition, where slabs provide access to buildings, it would be prudent to dowel the entrance to the building to permit rotation of the slab as the exterior ground shrinks and swells and to prevent a vertical offset at the entries.

7.1.4 Utility Trench Backfill

Excavations for utility trenches can be readily made with a backhoe. All trenches should conform to the current CAL-OSHA requirements. To provide uniform support, pipes or conduits should be bedded on a minimum of four inches of sand or fine gravel. After the pipes and conduits are tested, inspected (if required) and approved, they should be covered to a depth of six inches with clean sand or fine gravel, which should be mechanically tamped. Backfill for utility trenches and other excavations is also considered fill, and should be placed and compacted in accordance with the recommendations previously presented. If imported clean sand or gravel (defined as soil with less than 10 percent fines) is used as backfill, it should be compacted to at least 95 percent relative compaction. Jetting of trench backfill should not be permitted. Special care should be taken when backfilling utility trenches in pavement areas. Poor compaction may cause excessive settlements, resulting in damage to the pavement section.

Foundations for the proposed building should be bottomed below an imaginary line extending up at a 1.5:1 (horizontal to vertical) inclination from the base of utility trenches. Alternatively, the portion of the utility trench (excluding bedding) that is below the 1.5:1 line can be backfilled with controlled low-strength material (CLSM) with a 28-day unconfined compressive strength of at least 100 pounds per square inch (psi) or Class 2 AB compacted to at least 95 percent relative compaction.

Where utility trenches enter the building pad, an impermeable plug consisting of CLSM, at least three feet in length, should be installed where the trenches enter the building footprint. Furthermore, where sand- or gravel-backfilled trenches cross planter areas and pass below asphalt or concrete pavements, a similar plug should be placed at the edge of the pavement. The purpose of these recommendations is to reduce the potential for water to become trapped in trenches beneath the building or pavements. This trapped water can cause heaving of soils beneath slabs and softening of subgrade soil beneath pavements.

7.1.5 Drainage and Landscaping

Positive surface drainage should be provided around the building to direct surface water away from foundations. To reduce the potential for water ponding adjacent to the building, we recommend the ground surface within a horizontal distance of five feet from the building slope down away from the building with a surface gradient of at least two percent in unpaved areas and one percent in paved areas. In addition, roof downspouts should be discharged into controlled drainage facilities to keep the water away from the foundation. The use of water-intensive landscaping around the perimeter of the building should be avoided to reduce the amount of water introduced to the expansive clay subgrade.

Care should be taken to minimize the potential for subsurface water to collect beneath pavements and pedestrian walkways. Where landscape beds and tree wells are immediately adjacent to pavements and flatwork that are not designed as permeable systems, we recommend vertical cutoff barriers be incorporated into the design to prevent irrigation water from saturating the subgrade and AB. These barriers may consist of either flexible impermeable membranes or deepened concrete curbs.

Storm water treatment systems (infiltration basins, rain gardens, bio-retention systems, vegetated swales, flow-through planters, etc.), if constructed at the site, should be provided with underdrains, as well as impermeable liners. Due to the low permeability of the near-surface soil, these systems should not be designed for exfiltration in to the subgrade soil. The drainage layer beneath the "treatment" soil should consist of a minimum 12-inch-thick layer of Caltrans Class 2

Permeable drainage material and include a minimum six-inch-diameter perforated drain pipe with the perforations facing downward. An impermeable liner consisting of a high-density polyethylene membrane (or equivalent) that is at least 10 mils thick should line the entire bottom and sides of the system.

Prior experience and industry literature indicate that some species of high water-demand[10] trees can induce ground-surface settlement by drawing water from the expansive clay, causing it to shrink. Where these types of trees are planted near the proposed new buildings, the ground-surface settlement may result in damage to structure. This problem usually occurs 10 or more years after planting, as the trees reach mature height. To reduce the risk of tree-induced settlement, we recommend trees of the following genera not be planted within 25 feet of the building, unless adequate deep irrigation is provided at the tree locations: *Eucalyptus, Populus, Quercus, Crataegus, Salix, Sorbus* (simple-leafed), *Ulmus, Cupressus, Chamaecyparis,* and *Cupressocyparis.* Because this is a limited list and does not include all genera that may induce ground-surface settlement, a tree specialist should be consulted prior to selection of trees to be planted at the site.

7.2 Foundation Design

As discussed above, we conclude the proposed new building may be supported on a shallow foundation system, such as spread footings, or a P-T slab, provided the estimated settlements presented in Section 6.2 are acceptable from a structural and architectural standpoint. Recommendations for each foundation type are presented in the following sections.

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[10] "Water-demand" refers to the ability of the tree to withdraw large amounts of water from the soil subgrade, rather than soil suction exerted by the root system.

7.2.1 Spread Footings

The proposed new building may be supported on individual spread footings at interior column/wall locations and continuous, deepened perimeter footings provided the estimated settlements (static plus seismic) above can be tolerated by the structure. Continuous footings should be at least 18 inches wide and isolated spread footings should be at least 24 inches wide. Perimeter footings should be bottomed at least 36 inches below the lowest adjacent outside grade. The perimeter footing embedment depth may be decreased by six inches where pavement or concrete flatwork is immediately adjacent to the new building. Interior footings should extend at least 24 inches below the bottom of the capillary moisture break.

Spread footings may be designed using allowable bearing pressures of 2,500 pounds per square foot (psf) for dead-plus-live loads and 3,300 psf for total design loads, which include wind or seismic forces; these values include factors of safety of at least 2.0 and 1.5, respectively.

Lateral loads may be resisted by a combination of passive pressure on the vertical faces of the footings and friction between the bottoms of the footings and the supporting soil. To compute lateral resistance, we recommend using an equivalent fluid weight of 260 pounds per cubic foot (pcf) for sustained loads and a uniform passive pressure of 1,200 psf for transient loads; the upper foot of soil should be ignored unless confined by a slab or pavement. Frictional resistance should be computed using a base friction coefficient of 0.30. The passive pressure and frictional resistance values include a factor of safety of at least 1.5.

In general, we recommend all footings be founded below an imaginary plane extending up at an inclination of 1.5:1 (horizontal:vertical) from the base of any vault, utility trench, bioswale/ storm water treatment area, etc. If the design footing depth is above this plane, the footing can either be deepened, or over-excavated below the line and replaced with lean concrete (28-day compressive strength of at least 100 psi) to make up the difference.

Footing excavations should be free of standing water, debris, and disturbed materials prior to placing concrete. The bottoms and sides of the footing excavations should be moistened following excavation and maintained in a moist condition until concrete is placed. If the foundation soil dries during construction, the footing will eventually heave, which may result in cracking and distress. If the foundations are constructed during the wet season, we recommend mud slabs consisting of at least two inches of CLSM be placed in the bottoms of the footings to protect them from softening due to ponding water and/or disturbance from foot traffic during construction. We should check footing excavations prior to placement of the mud slabs or structural concrete. The CLSM used to construct the mud slabs should have a 28-day unconfined strength of at least 100 psi and should be poured within two days of footing excavation. The mud slab thickness may be counted as part of the minimum footing embedment.

7.2.2 P-T Slab Foundation

As an alternative to a spread footing foundation system, the proposed building may be supported on a post-tensioned slab foundation (P-T slab) underlain by at least 18 inches of imported non-expansive soil or lime-treated on-site soil. The edges of the P-T slabs should be thickened such that the foundation edge is bottomed at least nine inches below the adjacent exterior grade. In addition, we recommend the P-T slab edge be bottomed below an imaginary plane extending up at an inclination of 1.5:1 (horizontal:vertical) from the base of any vault, utility trench, bioswale/storm water treatment area, etc. If the design bottom-of-slab elevation is above this plane, the edge of mat can either be deepened, or over-excavated below the zone-of-influence line and replaced with CLSM (100 psi minimum) to make up the difference.

The maximum bearing pressure beneath the P-T slab should not exceed 2,500 psf under dead-plus-live load conditions and 3,300 psf under total load conditions, although we anticipate the average contact pressure will be significantly lower. For design of P-T slabs, we recommend using the parameters presented below in Table 3.

TABLE 3
P-T Slab Design Parameters

Parameter	Value
Edge moisture variation distance (e_m)	
edge lift	4.2 feet
center lift	8.2 feet
Differential Soil Movement (y_m)	
edge lift	1.4 inches
center lift	0.9 inches

Lateral loads can be resisted by a combination of passive pressure on the vertical faces of the P-T slabs and friction along the bottom of the slab. Lateral resistance may be computed using an equivalent fluid weight (triangular distribution) of 260 pcf for sustained load conditions and a uniform passive pressure of 1,200 psf for transient load conditions. Passive resistance in the upper one foot of soil should be ignored unless it is confined by slabs or pavement. Frictional resistance should be computed using a base friction coefficient of 0.30 where the P-T slab is in contact with soil. Where a vapor retarder is placed beneath the P-T slab, a base friction coefficient of 0.20 should be used. These values include a factor of safety of at least 1.5 and may be used in combination without reduction.

The P-T slab subgrade should be free of standing water, debris, and disturbed materials prior to placing concrete. The subgrade should be wetted following excavation and maintained in a moist condition until it is covered. We should check the foundation subgrade prior to placement of the vapor retarder.

Where water vapor transmission through the P-T slab is undesirable, we recommend installing a water vapor retarder beneath the mat. The vapor retarder may be placed directly on the smooth, compacted soil subgrade. The retarder should meet the requirements for Class A vapor retarders stated in ASTM E1745 and should be placed in accordance with the requirements of ASTM

E1643. These requirements include overlapping seams by six inches, taping seams, and sealing penetrations in the vapor retarder. Concrete mixes with high water/cement (w/c) ratios result in excess water in the concrete, which increases the cure time and results in excessive vapor transmission through the slab. Therefore, concrete for the mat foundations should have a low w/c ratio - less than 0.45. If necessary, workability should be increased by adding plasticizers. In addition, the mats should be properly cured. Before floor coverings, if any, are placed, the contractor should check that the concrete surface and the moisture emission levels (if emission testing is required) meet the manufacturer's requirements.

7.3 Concrete Slab-on-Grade Floors

If the proposed new building will be supported on footings, the floor slab may consist of a concrete slab-on-grade. The soil subgrade beneath the slab-on-grade floor should be prepared in accordance with the recommendations presented in Section 7.1, which includes placing at least 18 inches of imported select fill or lime-treated on-site soil beneath the slab.

Where water vapor moving through the slab is considered detrimental, we recommend installing a capillary moisture break and water vapor retarder beneath the floor slab. A capillary moisture break consists of at least four inches of clean, free-draining gravel or crushed rock. The vapor retarder should meet the requirements for Class B vapor retarders stated in ASTM E1745. The vapor retarder should be placed in accordance with the requirements of ASTM E1643. These requirements include overlapping seams by six inches, taping seams, and sealing penetrations in the vapor retarder. The particle size of the capillary break material should meet the gradation requirements presented in Table 4.

TABLE 4
Gradation Requirements for Capillary Moisture Break

Sieve Size	Percentage Passing Sieve
Gravel or Crushed Rock	
1 inch	90 – 100
3/4 inch	30 – 100
1/2 inch	5 – 25
3/8 inch	0 – 6

Concrete mixes with high water/cement (w/c) ratios result in excess water in the concrete, which increases the cure time and results in excessive vapor transmission through the slab. Therefore, concrete for the floor slabs should have a low w/c ratio - less than 0.45. If necessary, workability should be increased by adding plasticizers. In addition, the slabs should be properly cured. Before floor coverings, if any, are placed, the contractor should check that the concrete surface and the moisture emission levels (if emission testing is required) meet the manufacturer's

7.4 Pavement Design

Design recommendations for asphalt concrete and Portland cement concrete pavements are presented in the following sections.

7.4.1 Flexible (Asphalt Concrete) Pavement Design

The State of California flexible pavement design method was used to develop the recommended asphalt-concrete (AC) pavement sections. The final soil subgrade in asphalt-paved areas may consist of recompacted on-site clay or lime-treated native clay. If lime treatment is used to strengthen the soil subgrade, a minimum treatment depth of 18 inches should be used. The resistance value (R-value) test results indicate the upper on-site soil has an R-value of 15. Based on our experience, we selected an R-value of 30 for the lime-treated on-site soil. Recommended pavement sections for traffic indices (TIs) ranging from 4.5 to 6.5 are presented in Table 5. The Civil Engineer for the project should check that the TI's presented in this report are appropriate for the intended use. We can provide additional pavement sections for different TIs upon request.

TABLE 5
Asphalt-Concrete Pavement Sections

TI	Subgrade Lime Treated?	Asphaltic Concrete (inches)	Class 2 Aggregate Base R = 78 (inches)
4.5	No	2.5	8.0
4.5	Yes	2.5	5.5
5.0	No	3.0	8.0
5.0	Yes	3.0	5.5
5.5	No	3.0	10.0
5.5	Yes	3.0	7.0
6.0	No	3.5	10.5
6.0	Yes	3.5	7.5
6.5	No	4.0	11.5
6.5	Yes	4.0	8.0

The upper 12 inches of the subgrade should be moisture-conditioned and compacted in accordance with requirements presented in Table 2 in Section 7.1. The subgrade should be proof-rolled to confirm it is non-yielding prior to placement of the aggregate base. The aggregate base should be moisture-conditioned to near optimum and compacted to at least 95 percent relative compaction. The aggregate base should also be proof-rolled to confirm it is non-yielding prior to paving.

To prevent irrigation water from entering the pavement section, curbs adjacent to landscaped areas should extend through the base rock and at least three inches into the underlying clay. Where pavement is constructed near bio-swales or other storm water treatment areas, curbs should be deepened so that the base is founded below an imaginary line extending up at an inclination of 1.5:1 (horizontal: vertical) from the base of the bio-swale/treatment area.

7.4.2 Rigid (Portland Cement Concrete) Pavement

Concrete pavement design is based on a maximum single-axle load of 20,000 pounds and a maximum tandem axle load of 32,000 pounds and light truck traffic (i.e., a few trucks per week). The recommended rigid pavement section for these axle loads is 6-1/2 inches of Portland cement concrete over six inches of Class 2 aggregate base. Where fire truck traffic is expected, the pavement section should consist of seven inches of Portland cement concrete over six inches of Class 2 aggregate base.

The modulus of rupture of the concrete should be at least 500 psi at 28 days. Contraction joints should be constructed at 15-foot spacing. Where the outer edge of a concrete pavement meets asphalt concrete pavement, the concrete slab should be thickened by 50 percent at a taper not to exceed a slope of 1 in 10. For areas that will receive weekly garbage truck traffic, we recommend the slab be reinforced with a minimum of No. 4 bars at 16-inch spacing in both directions.

The upper 12 inches of the subgrade should be moisture-conditioned and compacted in accordance with requirements presented in Section 7.1. The aggregate base should be moisture-conditioned to near optimum and compacted to at least 95 percent relative compaction.

If pavements are adjacent to irrigated landscaped areas (including infiltration basins), curbs adjacent to those areas should extend through the aggregate base and at least three inches into the underlying soil to reduce the potential for irrigation water to infiltrate into the pavement section.

7.5 Seismic Design

We understand the proposed new building will be designed using the seismic provisions in the 2016 California Building Code (CBC). Although the CBC calls for a Site Class F designation for sites underlain by potentially liquefiable soil, we conclude a Site Class D designation is more appropriate because the potentially liquefiable layers are relatively thin and discontinuous; therefore, the site will not incur significant nonlinear behavior during strong ground shaking.

The latitude and longitude of the site are 37.6304° and -122.0487°, respectively. Hence, in accordance with the 2016 CBC, we recommend the following:

- $S_S = 2.41g$, $S_1 = 1.00g$
- $S_{MS} = 2.41g$, $S_{M1} = 1.50g$
- $S_{DS} = 1.61g$, $S_{D1} = 1.00g$
- $PGA_M = 0.93g$
- Seismic Design Category E for Risk Categories I, II, and III.

8.0 GEOTECHNICAL SERVICES DURING CONSTRUCTION

Prior to construction, Rockridge Geotechnical, Inc. should review the project plans and specifications to verify that they conform to the intent of our recommendations. During construction, our field engineer should provide on-site observation and testing during site preparation, grading, fill placement and compaction, and foundation installation. These observations will allow us to compare actual with anticipated soil conditions and to verify that the contractor's work conforms to the geotechnical aspects of the plans and specifications.

9.0 LIMITATIONS

This geotechnical investigation has been conducted in accordance with the standard of care commonly used as state-of-practice in the profession. No other warranties are either expressed or implied. The recommendations made in this report are based on the assumption that the soil and groundwater conditions do not deviate appreciably from those disclosed in the exploratory borings and CPTs. If any variations or undesirable conditions are encountered during construction, we should be notified so that additional recommendations can be made. The recommendations presented in this report are developed exclusively for the proposed development described in this report and are not valid for other locations and construction in the project vicinity.

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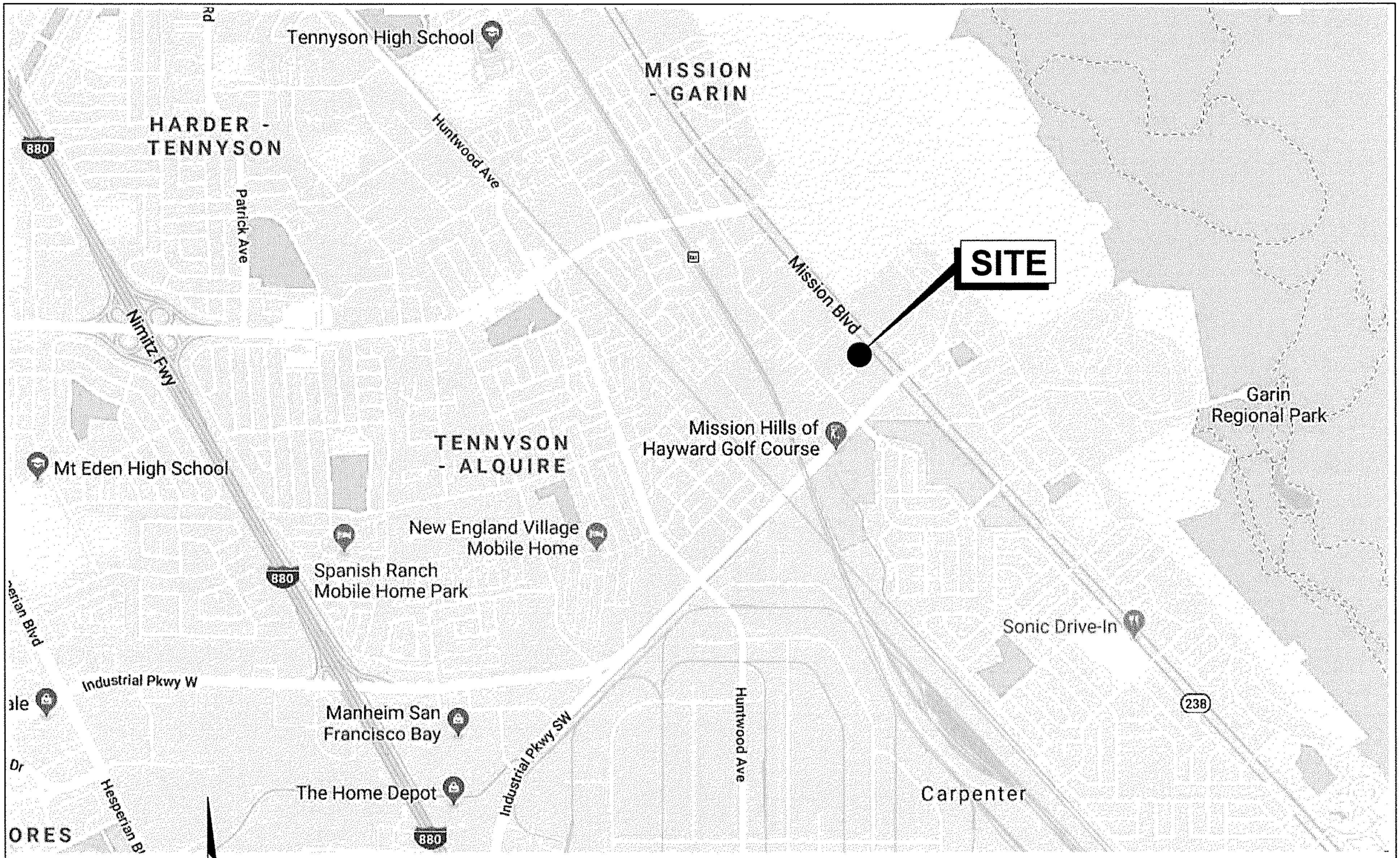
FIGURES

Attachment V



Base map: Google Map, 2018

0 2,000 4,000 Feet

Approximate scale

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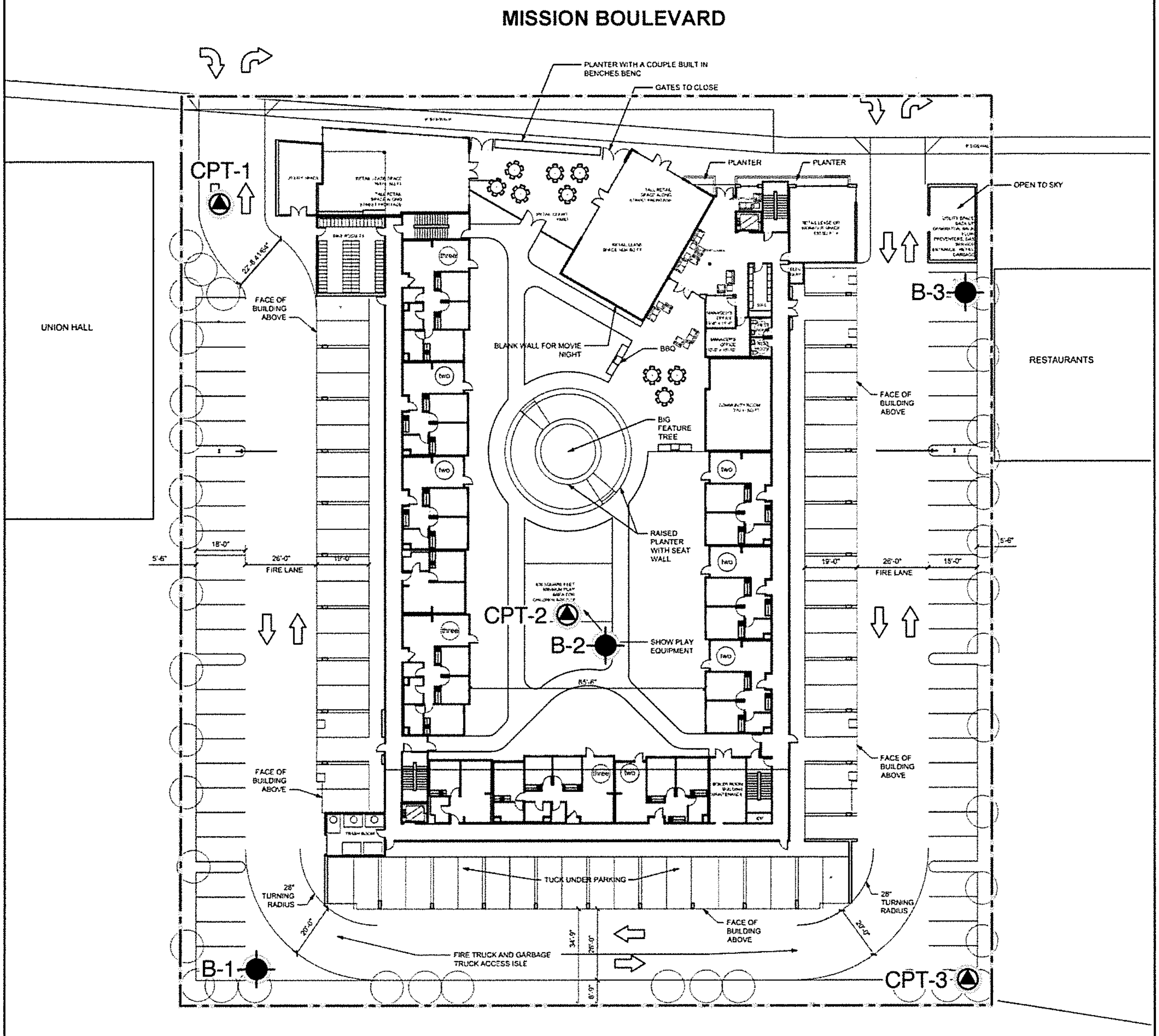
SITE LOCATION MAP

Date 06/26/18	Project No. 18-1515	Figure 1

Attachment V



EXPLANATION

CPT-1 ◭	Approximate location of cone penetration test by Rockridge Geotechnical Inc., June 14, 2018
B-1 ⊕	Approximate location of boring by Rockridge Geotechnical Inc., June 18, 2018
—— - ——	Project limits

0 60 Feet

Approximate scale

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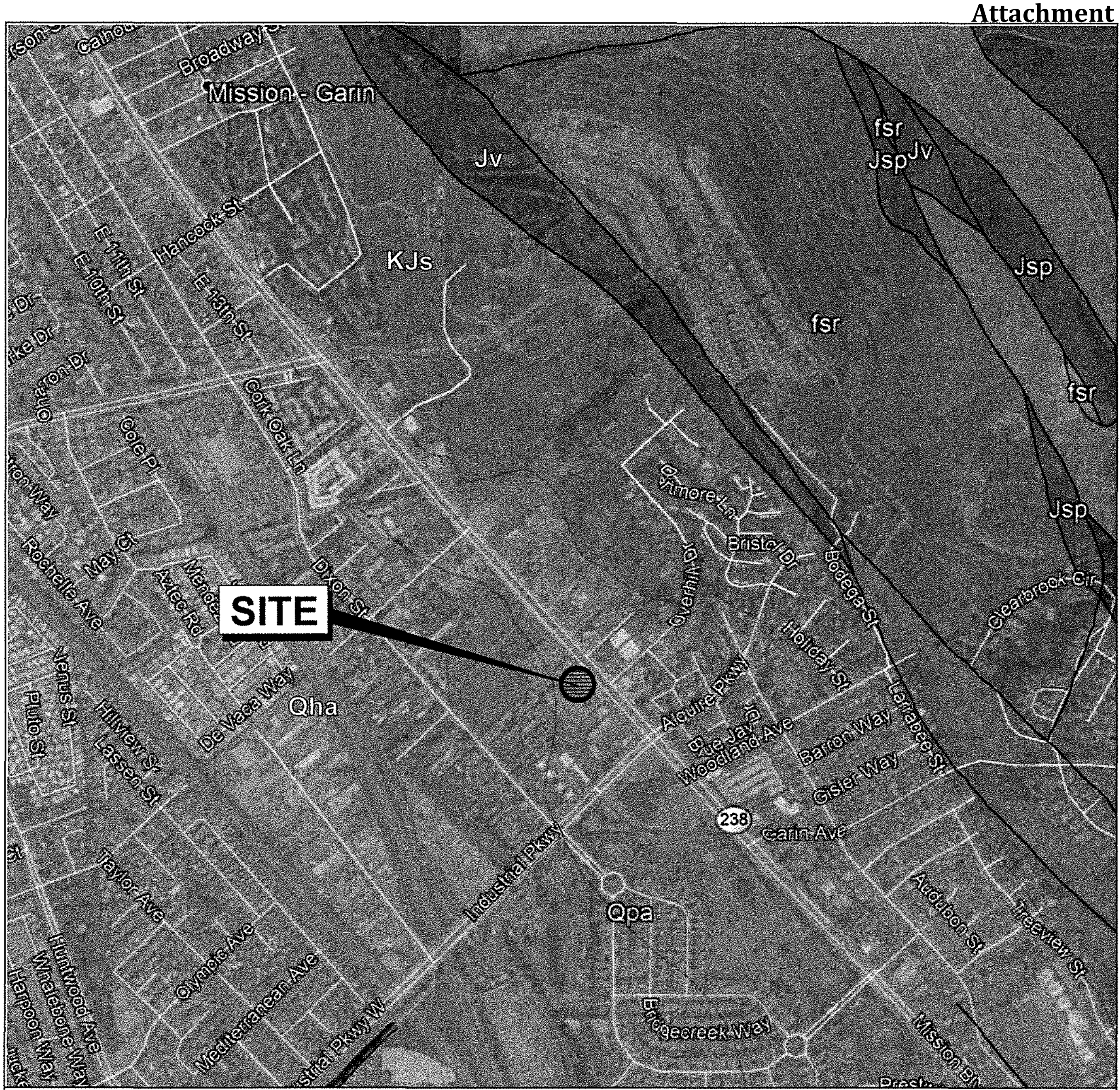
SITE PLAN

Date 08/22/18	Project No. 18-1515	Figure 2

Attachment V



Base map: Google Earth with U.S. Geological Survey (USGS), Alameda County, 2017.

EXPLANATION

Qha	Alluvium (Holocene)
Qpa	Alluvium (Pleistocene)
fsr	Franciscan Complex melange (Eocene, Paleocene, and (or) Late Cretaceous)
Kfs	Franciscan Complex sedimentary rocks (Cretaceous)
Jv	Great Valley complex volcanic rocks (Jurassic)
Jsp	Great Valley complex serpentinite (Jurassic)

Geologic contact: dashed where approximate and dotted where concealed, queried where uncertin

0 1000 2000 Feet

Approximate scale

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ROCKRIDGE
GEOTECHNICAL

REGIONAL GEOLOGIC MAP

Date 06/26/18	Project No. 18-1515	Figure 3

Attachment V

Base Map: U.S. Geological Survey (USGS), National Seismic Hazards Maps - Fault Sources, 2008.

EXPLANATION

Strike slip

Thrust (Reverse)

Normal

0 5 10 Miles

Approximate scale

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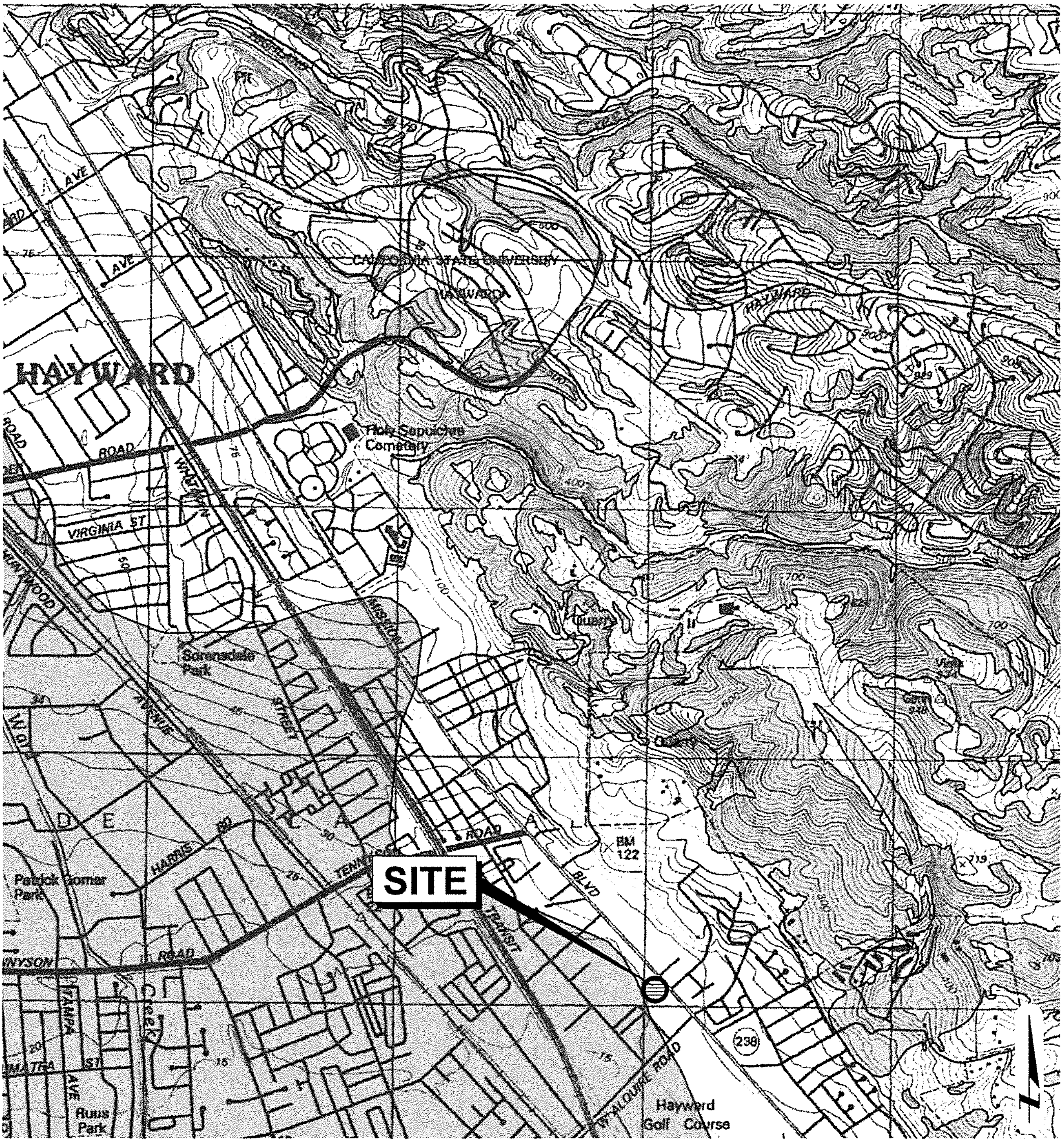
ROCKRIDGE GEOTECHNICAL

REGIONAL FAULT MAP

Date 06/26/18	Project No. 18-1515	Figure 4



EXPLANATION

░ **Liquefaction;** Areas where historic occurence of liquefaction, or local topographic, geological, geotechnical, and subsurface water conditions indicate a potential for permanent ground displacements.

▒ **Earthquake-Induced Landslides;** Areas where previous occurence of landslide movement, or local topographic, geological, geotechnical, and subsurface water conditions indicate a potential for permanent ground displacements.

0 2000 4000 Feet

Approximate scale

Reference:
State of California "Seismic Hazard Zones"
Hayward Quadrangle.
Released on July 2, 2003

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SEISMIC HAZARDS ZONE MAP

Date 06/26/18	Project No. 18-1515	Figure 5

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APPENDIX A
Logs of Borings and Cone Penetration Test Results

Attachment V

PROJECT: **META HOUSING**
29497 MISSION BOULEVARD
Hayward, California

Log of Boring B-1

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Date started: 6/18/18
Date finished: 6/18/18
Drilling method: Benevent 4" Solid Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Safety Hammer
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)
Logged by: M. Hachey

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
0						CLAYEY SAND with GRAVEL (SC) brown, medium dense, trace debris FILL						
2	S&H	▨	10 17 20	26	SC							
4	S&H	▨	12 9 18	19		CLAY with SAND (CH) olive-brown, very stiff, moist, fine sand						
6	S&H	▨	10 12 16	20	CH	dark brown, trace organics					12.4	
9						▽ CLAY with SAND (CL) olive-brown, very stiff, wet, fine sand						
11	S&H	▨	10 13 14	19								
16	S&H	▨	6 6 8	10		stiff, decrease in sand content Particle Size Distribution; see Appendix B	TV		2,000	82	37.3	86
18					CL							
21	SPT	◪	3 4 4	10		gray, trace gravel						
26	SPT	◪	4 6 8	17		very stiff						

Boring terminated at a depth of 26.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater encountered at a depth of 9 feet during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively, to account for sampler type and hammer energy.

ROCKRIDGE GEOTECHNICAL

Project No.: 18-1515
Figure: A-1

Attachment V

PROJECT: **META HOUSING**
29497 MISSION BOULEVARD
Hayward, California

Log of Boring B-2

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Date started: 6/18/18
Date finished: 6/18/18
Drilling method: Benevent 4" Solid Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Safety Hammer
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)
Logged by: M. Hachey

	SAMPLES						LABORATORY TEST DATA					
DEPTH (feet)	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
0–3.5						SANDY CLAY (CL) gray and red-brown, very stiff, moist FILL						
2	S&H	▨	12 13 12	18	CL						11.6	111
4	S&H	▨	8 9 13	15	CH	CLAY (CH) dark brown, very stiff, slightly moist, trace organics						
4.5					CH	SANDY CLAY (CH) olive-brown, medium stiff to stiff, moist						
6	S&H	▨	7 11 13	17	CH	CLAY with SAND (CH) gray-brown, very stiff, moist LL = 66, PI = 45; see Appendix B	TxUU	600	3,980		20.7	104
8						∇ CLAY with SAND (CL) olive-brown, stiff to very stiff, wet, fine sand, trace fine organics Particle Size Distribution; see Appendix B						
11	S&H	▨	4 6 9	11			TV		2,500	78	24.7	104
14					CL							
16	S&H	▨	7 10 12	15		olive-gray, stiff to very stiff, wet, decreased plasticity						
20						SANDY CLAY (CL) mottled light gray and olive-gray, stiff, wet, trace gravel						
21	SPT	◩	4 5 5	12								
26	SPT	◩	6 6 11	20	CL	very stiff, no gravel						
31	SPT	◩	6 8 13	25								
32												

Boring terminated at a depth of 31.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater encountered at a depth of 9 feet during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively, to account for sampler type and hammer energy.

ROCKRIDGE GEOTECHNICAL

Project No.: 18-1515
Figure: A-2

Attachment V

PROJECT: **META HOUSING**
29497 MISSION BOULEVARD
Hayward, California

Log of Boring B-3

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Date started: 6/18/18
Date finished: 6/18/18
Drilling method: Benevent 4" Solid Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Safety Hammer
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)
Logged by: M. Hachey

	SAMPLES						LABORATORY TEST DATA					
DEPTH (feet)	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1 2	S&H		9 7 11	13	CH	CLAY with SAND (CH) dark brown, stiff, moist, trace organics LL = 59, PI = 39; see Appendix B					18.2	100
3 4	S&H		7 10 14	17		CLAY with SAND (CH) gray-brown, very stiff, moist, trace organics LL = 52, PI = 36; see Appendix B					18.5	111
5 6	S&H		7 9 17	18	CH		TxUU	600	2,830		19.1	109
7 8												
9						▽ SANDY CLAY (CL) mottled gray and orange brown with black staining, very stiff, moist, trace gravel						
10 11	S&H		9 13 20	23								
12 13 14					CL							
15 16	S&H		9 13 16	20								
17 18 19												
20 21	S&H		6 9 12	15		SANDY CLAY with GRAVEL (CL) gray-brown with some iron staining, stiff to very stiff, wet, sub-angular gravel						
22 23 24												
25 26	SPT		6 7 10	20	CL	very stiff						
27 28 29												
30 31	SPT		6 9 13	26								
32												

Boring terminated at a depth of 31.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater encountered at a depth of 9 feet during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively, to account for sampler type and hammer energy.

ROCKRIDGE GEOTECHNICAL

Project No.: 18-1515
Figure: A-3

Attachment V

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions		Symbols	Typical Names
Coarse-Grained Soils (more than half of soil > no. 200 sieve size)	Gravels (More than half of coarse fraction > no. 4 sieve size)	GW	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines
		GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	Sands (More than half of coarse fraction < no. 4 sieve size)	SW	Well-graded sands or gravelly sands, little or no fines
		SP	Poorly-graded sands or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
Fine -Grained Soils (more than half of soil < no. 200 sieve size)	Silts and Clays LL = < 50	ML	Inorganic silts and clayey silts of low plasticity, sandy silts, gravelly silts
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
		OL	Organic silts and organic silt-clays of low plasticity
	Silts and Clays LL = > 50	MH	Inorganic silts of high plasticity
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic silts and clays of high plasticity
Highly Organic Soils		PT	Peat and other highly organic soils

GRAIN SIZE CHART

Classification	Range of Grain Sizes	
	U.S. Standard Sieve Size	Grain Size in Millimeters
Boulders	Above 12"	Above 305
Cobbles	12" to 3"	305 to 76.2
Gravel coarse fine	3" to No. 4 3" to 3/4" 3/4" to No. 4	76.2 to 4.76 76.2 to 19.1 19.1 to 4.76
Sand coarse medium fine	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200	4.76 to 0.075 4.76 to 2.00 2.00 to 0.420 0.420 to 0.075
Silt and Clay	Below No. 200	Below 0.075

▽ Unstabilized groundwater level

▼ Stabilized groundwater level

SAMPLE DESIGNATIONS/SYMBOLS

▤ Sample taken with Sprague & Henwood split-barrel sampler with a 3.0-inch outside diameter and a 2.43-inch inside diameter. Darkened area indicates soil recovered

◩ Classification sample taken with Standard Penetration Test sampler

◨ Undisturbed sample taken with thin-walled tube

☒ Disturbed sample

⊡ Sampling attempted with no recovery

◫ Core sample

▣ Analytical laboratory sample

▥ Sample taken with Direct Push sampler

▥ Sonic

SAMPLER TYPE

C	Core barrel
CA	California split-barrel sampler with 2.5-inch outside diameter and a 1.93-inch inside diameter
D&M	Dames & Moore piston sampler using 2.5-inch outside diameter, thin-walled tube
O	Osterberg piston sampler using 3.0-inch outside diameter, thin-walled Shelby tube
PT	Pitcher tube sampler using 3.0-inch outside diameter, thin-walled Shelby tube
S&H	Sprague & Henwood split-barrel sampler with a 3.0-inch outside diameter and a 2.43-inch inside diameter
SPT	Standard Penetration Test (SPT) split-barrel sampler with a 2.0-inch outside diameter and a 1.5-inch inside diameter
ST	Shelby Tube (3.0-inch outside diameter, thin-walled tube) advanced with hydraulic pressure

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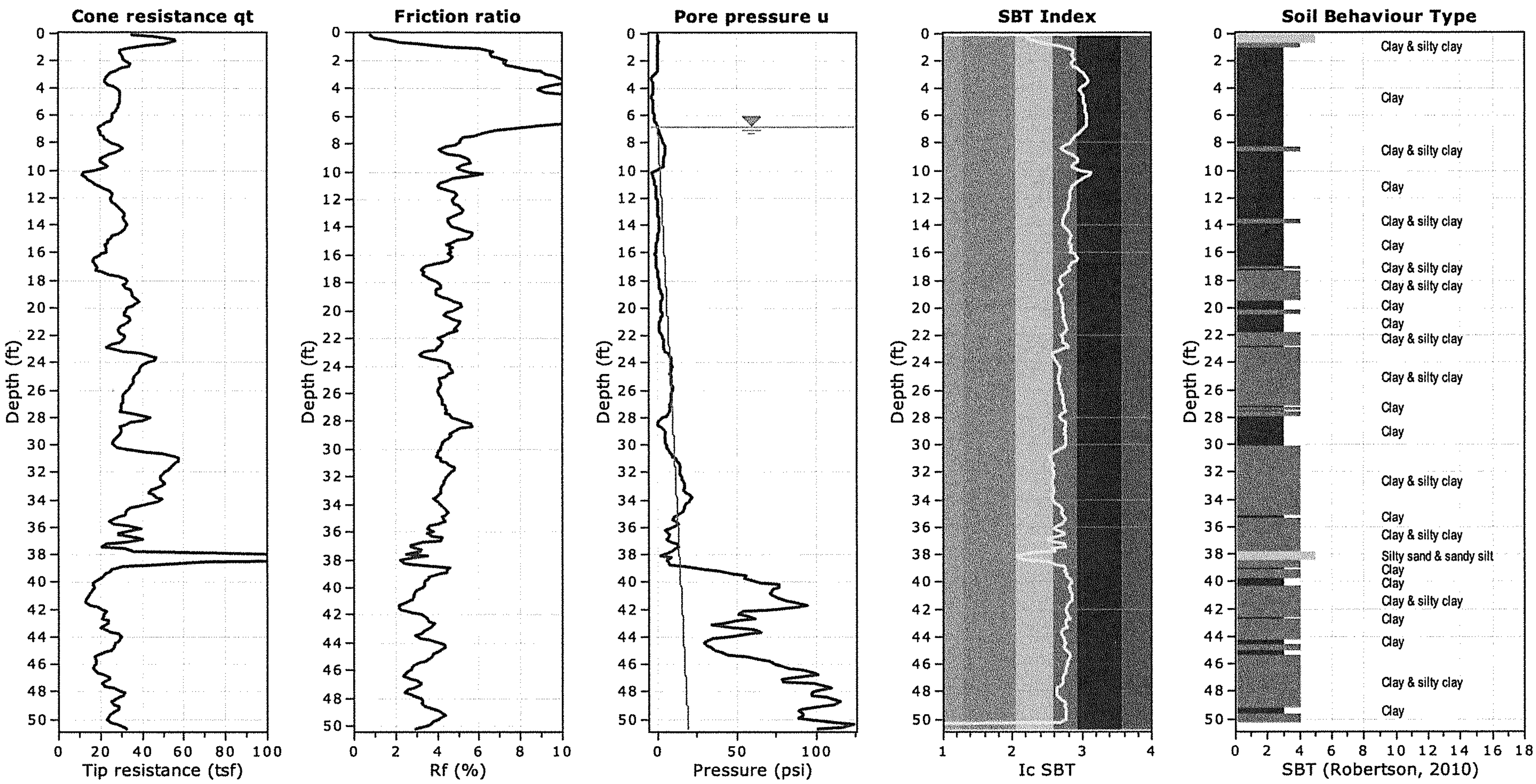
CLASSIFICATION CHART

Date 06/26/18 | Project No. 18-1515 | Figure A-4

Attachment V



Total depth: 50.69 ft, Date: 6/14/2018
Estimated Depth to Groundwater: 6.8 feet
Cone Operator: Middle Earth Geo Testing, Inc.

SBT legend

▨ 1. Sensitive fine grained	▨ 4. Clayey silt to silty clay	▨ 7. Gravely sand to sand
▨ 2. Organic material	▨ 5. Silty sand to sandy silt	▨ 8. Very stiff sand to clayey sand
▨ 3. Clay to silty clay	▨ 6. Clean sand to silty sand	▨ 9. Very stiff fine grained

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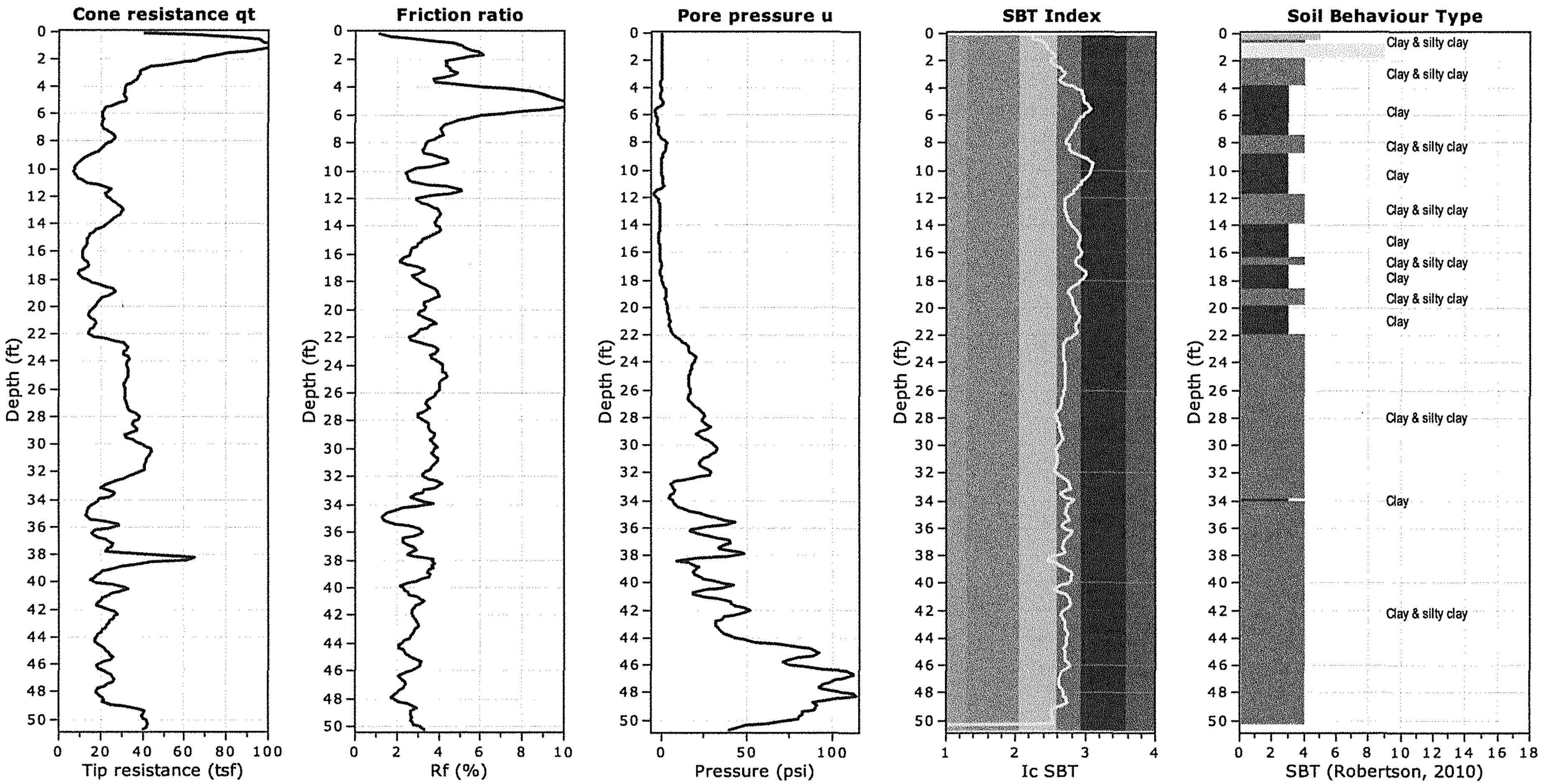
CONE PENETRATION TEST RESULTS
CPT-1

Date 10/31/18 | Project No. 18-1515 | Figure A-5

Attachment V



SBT legend

▨ 1. Sensitive fine grained	▨ 4. Clayey silt to silty clay	▨ 7. Gravely sand to sand
▨ 2. Organic material	▨ 5. Silty sand to sandy silt	▨ 8. Very stiff sand to clayey sand
▨ 3. Clay to silty clay	▨ 6. Clean sand to silty sand	☐ 9. Very stiff fine grained

Total depth: 50.69 ft, Date: 6/14/2018
Groundwater not measured
Cone Operator: Middle Earth Geo Testing, Inc.

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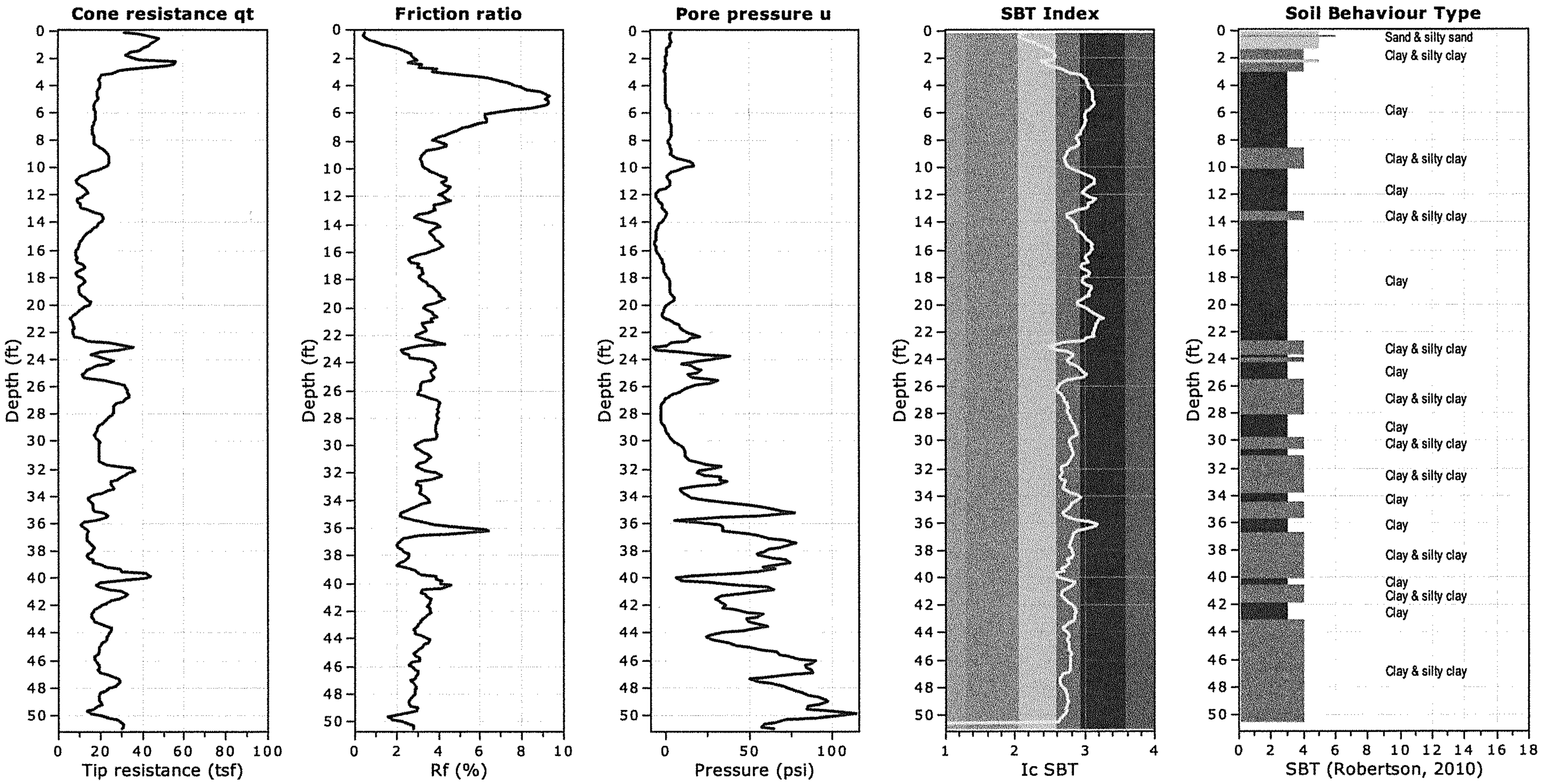
CONE PENETRATION TEST RESULTS
CPT-2

Date 10/31/18 | Project No. 18-1515 | Figure A-6



SBT legend

▨ 1. Sensitive fine grained
▨ 2. Organic material
▨ 3. Clay to silty clay
▨ 4. Clayey silt to silty clay
▨ 5. Silty sand to sandy silt
▨ 6. Clean sand to silty sand
▨ 7. Gravely sand to sand
▨ 8. Very stiff sand to clayey sand
☐ 9. Very stiff fine grained

Total depth: 51.02 ft, Date: 6/14/2018
Groundwater not measured
Cone Operator: Middle Earth Geo Testing, Inc.

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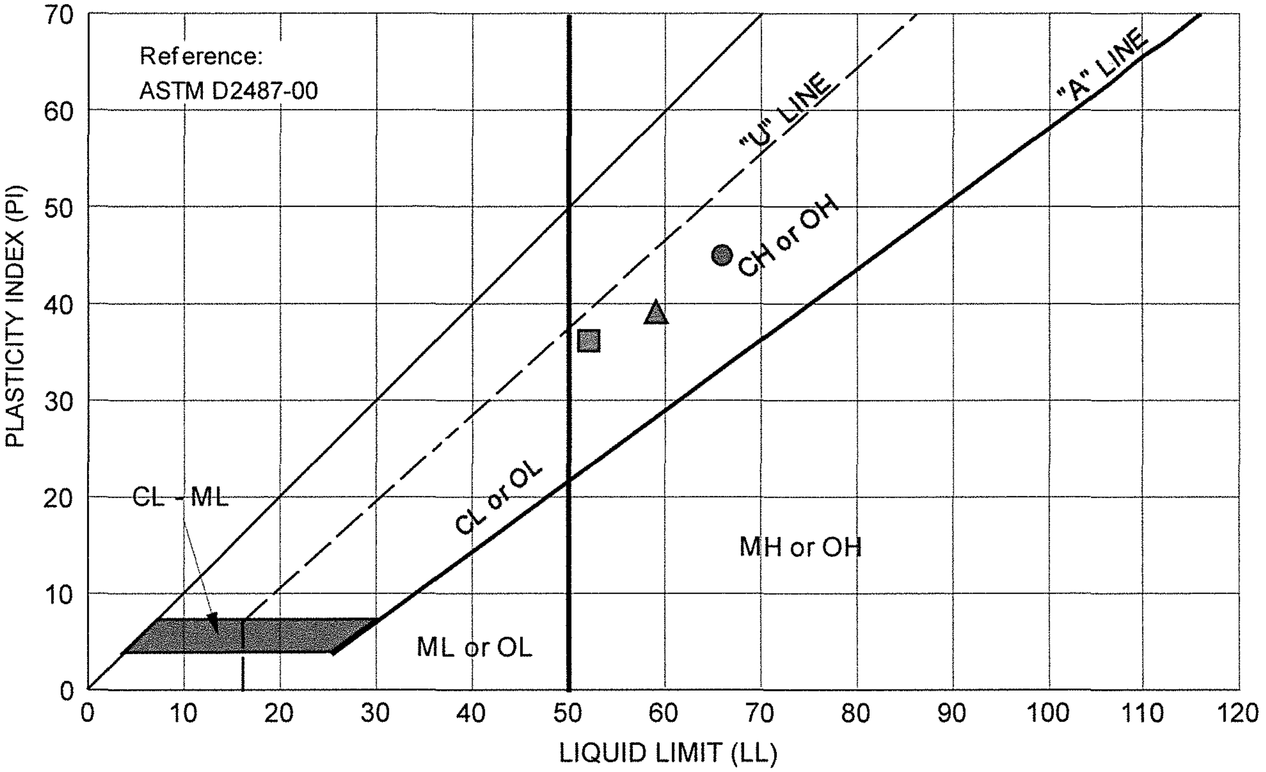
CONE PENETRATION TEST RESULTS
CPT-3

Date 10/31/18	Project No. 18-1515	Figure A-7

APPENDIX B
Laboratory Test Results

Attachment V



Symbol	Source	Description and Classification	Natural M.C. (%)	Liquid Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
●	B-2 at 6.0 feet	CLAY with SAND (CH), gray-brown	20.7	66	45	--
▲	B-3 at 1.5 feet	CLAY with SAND (CH), dark brown	18.2	59	39	--
■	B-3 at 4.0 feet	CLAY with SAND (CH), gray-brown	18.5	52	36	--

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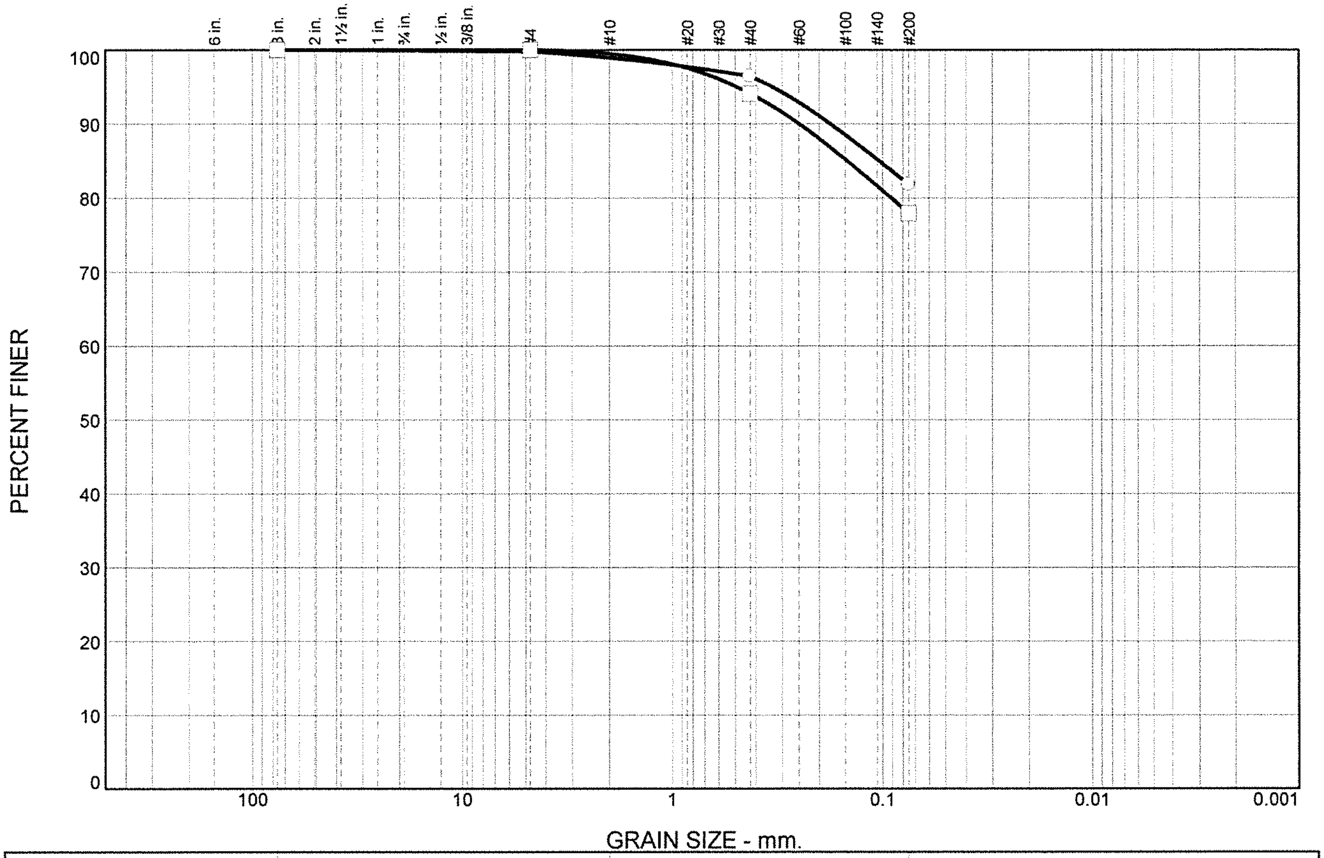
PLASTICITY CHART

Date 10/31/18 | Project No. 18-1515 | Figure B-1

Attachment V



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay

MATERIAL DATA

SYMBOL	SOURCE	DEPTH (ft.)	Material Description	USCS
○	B-1	15.0'	CLAY with SAND, olive-brown	CL
☐	B-2	11.0'	CLAY with SAND, olive-brown	CL

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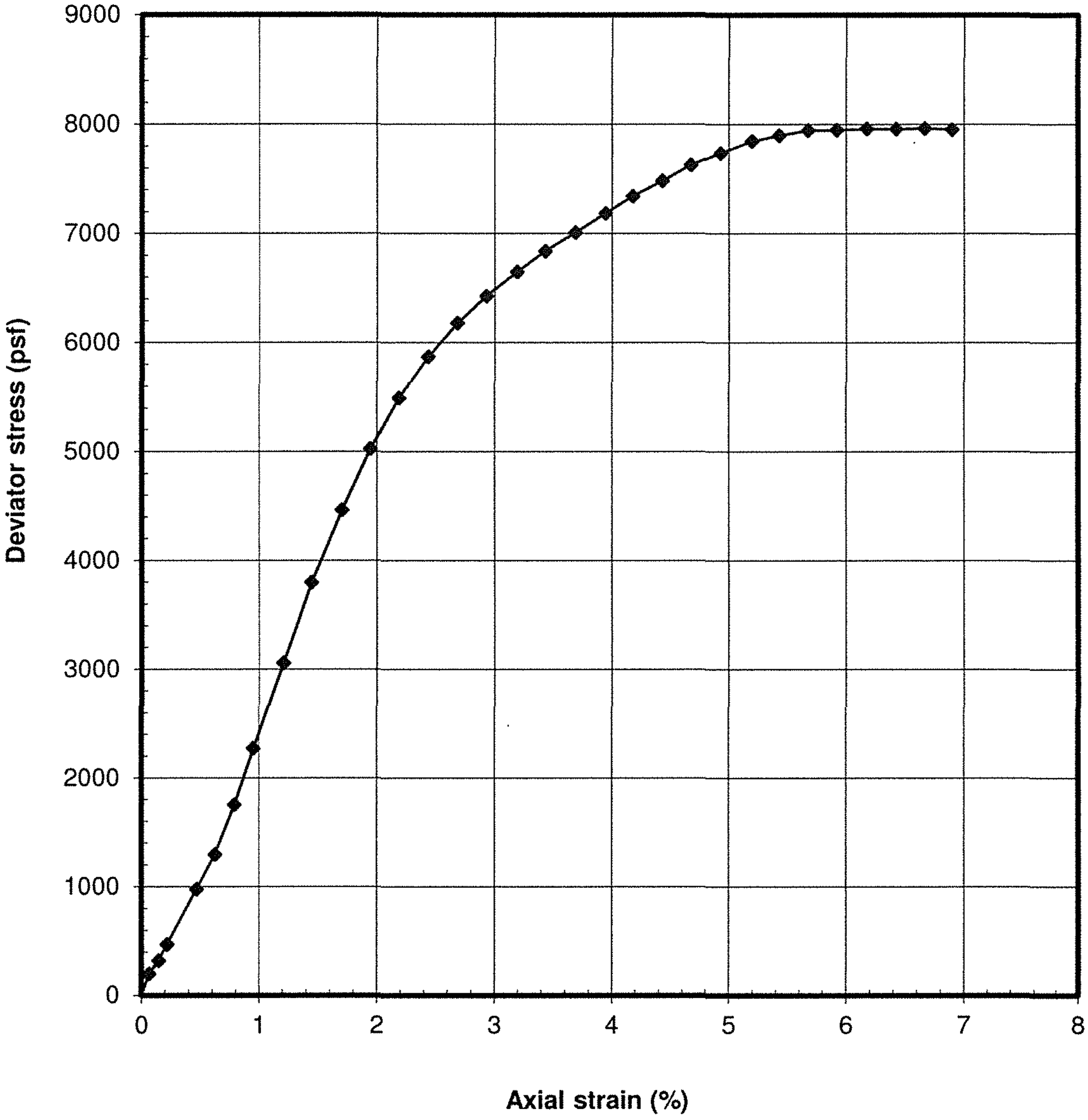
PARTICLE SIZE DISTRIBUTION REPORT

Date 10/31/18 | Project No. 18-1515 | Figure B-2

Attachment V



Sampler Type: Sprague & Henwood		Shear Strength:	3980 psf
Diameter (in): 2.39	Height (in): 4.93	Strain at Failure:	6.7%
Moisture Content:	20.7 %	Confining Pressure:	600 psf
Dry Density:	104 pcf	Strain Rate:	1%/min
Source:	B-2 at 6.0 feet		
Description:	CLAY with SAND (CH), gray-brown		

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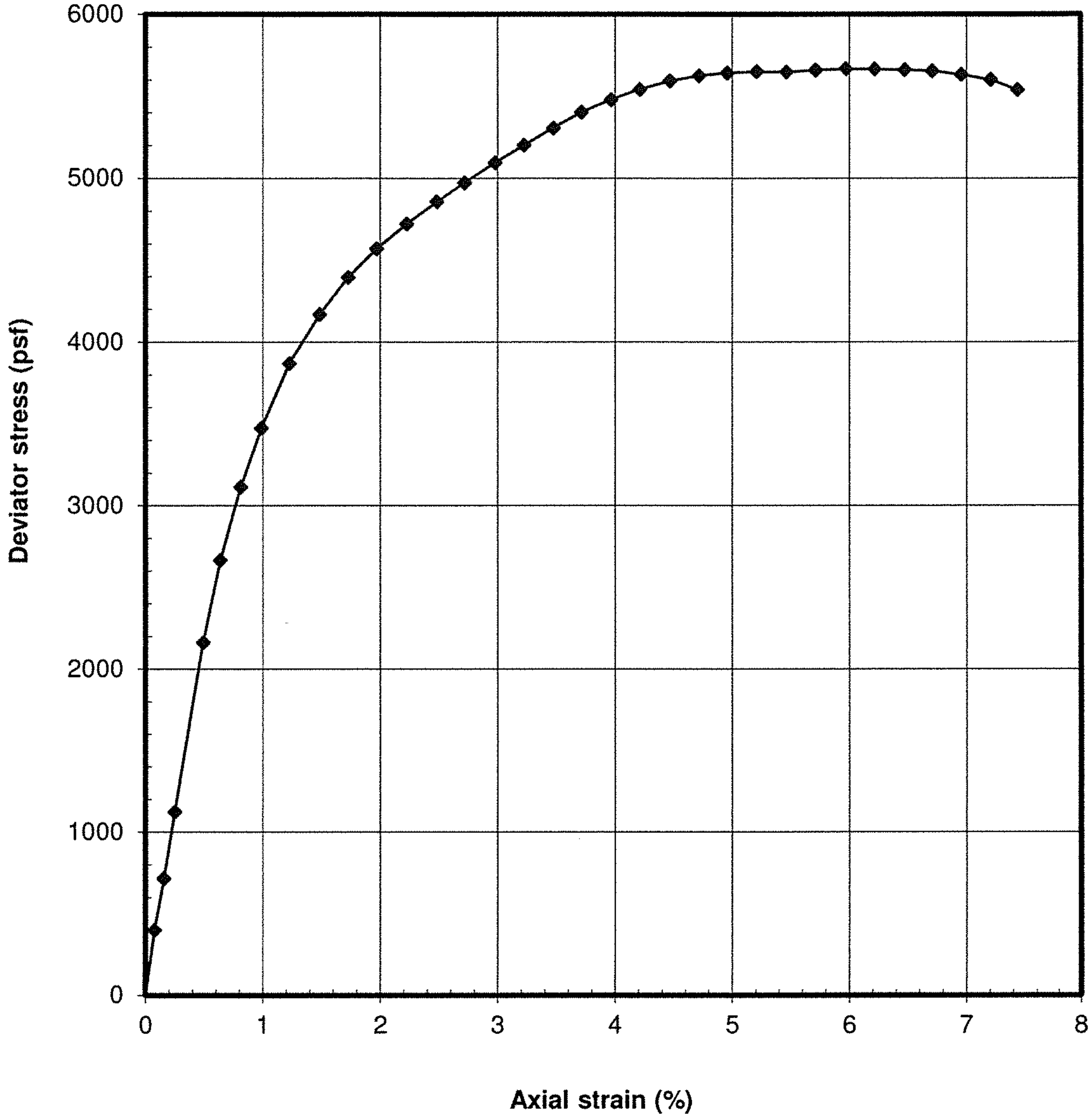
UNCONSOLIDATED-UNDRAINED
TRIAXIAL COMPRESSION TEST

Date: 06/25/18 | Project No. 18-1515 | Figure B-3



Sampler Type: Sprague & Henwood		Shear Strength: 2830 psf
Diameter (in): 2.39	Height (in): 6.02	Strain at Failure: 6.0%
Moisture Content: 19.1 %		Confining Pressure: 600 psf
Dry Density: 109 pcf		Strain Rate: 1%/min

Source: B-3 at 6.0 feet

Description: CLAY with SAND (CH), gray-brown

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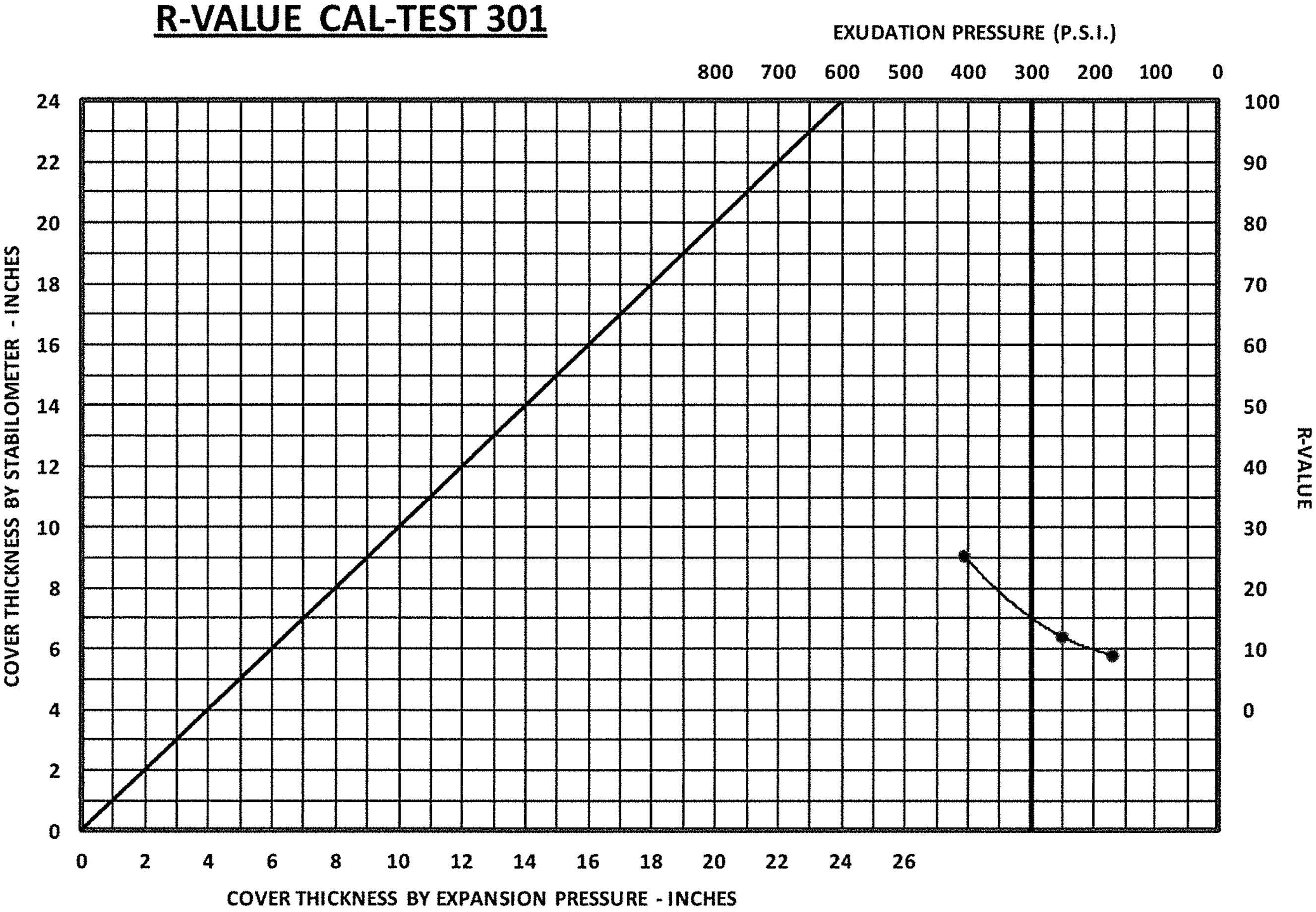
UNCONSOLIDATED-UNDRAINED
TRIAXIAL COMPRESSION TEST

Date: 06/25/18 | Project No. 18-1515 | Figure B-4

R-VALUE CAL-TEST 301



Exudation psi	Compaction (psi)	Expansion (0.0001")	Expansion (psf)	Moisture %	Dry Density	Resistance Value
407	172	21	91	17.1	112.8	25
252	108	2	9	19.8	106.7	12
172	78	2	9	21.3	104.4	9

Test Results

R-Value at 300 psi exudation pressure = 15

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R-VALUE TEST REPORT

Date 08/21/18	Project No. 18-1515	Figure B-5

Attachment V

Results Only Soil Testing
for
Meta Housing, Hayward

June 26, 2018

Prepared for:
Devin Landkamer
Rockridge Geotechnical
270 Grand Ave,
Oakland, CA 94610
dlandkamer@rockridgegeo.com

Project X Job#: S180621A
Client Job or PO#: 18-1515

Soil Analysis Lab Results

Client: Rockridge Geotechnical
Job Name: Meta Housing, Hayward
Client Job Number: 18-1515
Project X Job Number: S180621A
June 26, 2018

	Method	ASTM G187		ASTM D516		ASTM D512B		SM 4500-NO3-E	SM 4500-NH3-C	SM 4500-S2-D	ASTM G200	ASTM G51
Bore# / Description	**Depth**	**Resistivity** As Rec'd	Minimum	**Sulfates**		**Chlorides**		**Nitrate**	**Ammonia**	**Sulfide**	**Redox**	**pH**
	(ft)	(Ohm-cm)	(Ohm-cm)	(mg/kg)	(wt%)	(mg/kg)	(wt%)	(mg/kg)	(mg/kg)	(mg/kg)	(mV)	
B-3	2.0	1,139	938	60	0.0060	30	0.0030	72	6.0	0.66	87	7.49

Unk = Unknown
NT = Not Tested
ND = 0 = Not Detected
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
Chemical Analysis performed on 1:3 Soil-To-Water extract

Please call if you have any questions.

Prepared by,

Nathan Jacob
Lab Technician

Respectfully Submitted,

Eddie Hernandez, M.Sc., P.E.
Sr. Corrosion Consultant
NACE Corrosion Technologist #16592
Professional Engineer
California No. M37102
ehernandez@projectxcorrosion.com

EDUARDO HERNANDEZ
No. M37102

Project X
Corrosion Engineering
Corrosion Control - Soil, Water, and Metallurgy Lab

S180621A Rockridge 18-1515 1 Full

Attachment V

Lab Request Sheet Chain of Custody

Phone: (213) 928-7213 · Fax (951) 226-1720 · www.projectxcorrosion.com
Ship Samples To: 29970 Technology Dr, Suite 105F, Murrieta, CA 92563

Project X Job Number S180621A Rockridge 18-1515 1 Full

IMPORTANT: Please complete Project and Sample Identification Data as you would like it to appear in report & include this form with samples.

Company Name: Rockridge Geotechnical
Contact Name: Devin Landkamer
Phone No. : 510-420-5738
Mailing Address: 270 Grand Avenue, Oakland 94610
Contact Email: dlandkamer@rockridgegeo.com
Accounting Contact: Jarka Stepanek
Invoice Email: invoices@rockridgegeo.com
Client Project No: 18-1515
P.O. #:
Project Name: Meta Housing, Hayward

Turn Around Time: 5 Day Normal ☑ 3 Day RUSH 75% mark-up ☐ 2 Day RUSH 100% mark-up ☐

Results By: ☐ Phone ☐ Fax ☑ Email ☐ Mail ☐ Overnight Mail (charges apply)

Date & Received by :

SPECIAL INSTRUCTIONS:

ANALYSIS REQUESTED (Please circle)

	SAMPLE ID - BORE #	DESCRIPTION	DEPTH (ft)	DATE COLLECTED	CORROSION SERIES	Soil Resistivity	pH	Sulfate	Chloride	Redox Potential	BiCarbonate	Alkalinity	Acidity	Nitrate	Ammonia	Sulfide	Moisture Content	Soil Corrosivity Evaluation Report	Metallurgical Analysis	NOTES
				Default Method	Min. Resistivity, Sulfate, Chloride, Sulfide, Redox,	ASTM G187 AASHTO T2888 Caltrans CTM64	ASTM G51 AASHTO T 289 Caltrans CTM64	ASTM D516 AASHTO T 290 Caltrans CTM41	ASTM D512B AASHTO T 291 Caltrans CTM42	SM 2580B	SM 2320B	SM 2520B	SM 2510B	Hach 835 SM 4500-NO3	Hach 830 SM 4500-NH3	SM 4500-S2 SM 4500-S2	ASTM D2216			
1	B-3	CLAY with SAND (CL) dark brown	2	06/18/18	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
2					☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
3					☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
4					☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
5					☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
6					☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
7					☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
8					☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
9					☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
10					☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
11					☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
12					☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
13					☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
14					☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	

Appendix F

Phase I Environmental Site Assessment

Attachment V

PARTNER
Engineering and Science, Inc.

PHASE I ENVIRONMENTAL SITE ASSESSMENT REPORT

Hayward Mission
29497, 29505, 29547, & 29553 Mission Boulevard
Hayward, California 94544

Report Date: March 5, 2018
Partner Project No. 17-202015.1

Prepared for:

Meta Housing Corporation
11150 West Olympic Boulevard, Suite 620
Los Angeles, California 90064

Attachment V

PARTNER
Engineering and Science, Inc.

March 5, 2018

Ross Ferrera
Meta Housing Corporation
11150 West Olympic Boulevard, Suite 620
Los Angeles, California 90064

Subject: Phase I Environmental Site Assessment
Hayward Mission
29497, 29505, 29547, & 29553 Mission Boulevard
Hayward, California 94544
Partner Project No. 17-202015.1

Dear Mr. Ferrera:

Partner Engineering and Science, Inc. (Partner) is pleased to provide the results of the *Phase I Environmental Site Assessment* (Phase I ESA) report of the abovementioned address (the "subject property"). This assessment was performed in conformance with the scope and limitations as detailed in the ASTM Practice E1527-13 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.

This assessment included a site reconnaissance as well as research and interviews with representatives of the public, property ownership, site manager, and regulatory agencies. An assessment was made, conclusions stated, and recommendations outlined.

We appreciate the opportunity to provide environmental services to you. If you have any questions concerning this report, or if we can assist you in any other matter, please contact me at (310) 765-7243.

Sincerely,

Jenny Redlin, REPA
Relationship Manager

EXECUTIVE SUMMARY

Partner Engineering and Science, Inc. (Partner) has performed a Phase I Environmental Site Assessment (ESA) in accordance with the scope of work and limitations of ASTM Standard Practice E1527-13, the Environmental Protection Agency Standards and Practices for All Appropriate Inquiries (AAI) (40 CFR Part 312) and set forth by Meta Housing Corporation for the property located at 29497, 29505, 29547, & 29553 Mission Boulevard in the City of Hayward, Alameda County, California (the "subject property"). The Phase I Environmental Site Assessment is designed to provide Meta Housing Corporation with an assessment concerning environmental conditions (limited to those issues identified in the report) as they exist at the subject property.

Property Description

The subject property is located on the southwest side of Mission Boulevard within a mixed commercial and residential area of Alameda County. Please refer to the table below for further description of the subject property:

Subject Property Data	
Address(es):	29497, 29505, 29547, & 29553 Mission Boulevard, Hayward, California
Historical Address(es):	29497, 29505, 29547, & 29553 Castro Street/Niles Road-State Highway
Property Use:	Vacant
Land Acreage (Ac):	2.01 Ac
Number of Buildings:	None
Assessor's Parcel Number (APN):	078C-0438-013-06 (Parcel A); 078C-0438-014 (Parcel B); 078C-0438-015-02 (Parcel C); 078C-0438-015-01 (Parcel D)
Current Tenants:	None – Vacant Land
Site Assessment Performed By:	Bailey Balshor of Partner
Site Assessment Conducted On:	February 26, 2018

The subject property is currently vacant land covered in natural vegetation. No onsite operations are currently conducted at the subject property.

The subject property was historically developed with residences on the northeast side of the property from as early as 1939. The southeastern portion of the subject property appears to have been utilized for agricultural purposes from as early as 1946 until circa-1958. By 1982, all residential structures except one remaining residence were removed from the subject property. In 2002, the remaining residential structure was demolished, and the subject property has remained vacant land since that time.

The immediately surrounding properties consist of Laborers International Union of North America to the north and NorCal Tire Pro to the northeast across Mission Boulevard; Red Chili Restaurant and Just Potato Salad to the southeast and Parkway Pines Apartments to the south; Thrift Center and Kash Fabrics Inc/Threading Salon to the east across Mission Boulevard; and Dixon and Cherry Hill Apartments to the west.

According to topographic map interpretation and a previous subsurface investigation conducted on a nearby property (29705 Mission Boulevard, San Francisco Bay RWQCB Case Number 01S0726), the depth and direction of groundwater in the vicinity of the subject property is inferred to be approximately 8 to 25 feet below ground surface (bgs) and flow toward the southwest.

Findings

A *recognized environmental condition (REC)* refers to the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: due to release to the environment; under conditions indicative of a release to the environment; or under conditions that pose a material threat of a future release to the environment. The following was identified during the course of this assessment:

- Partner did not identify any RECs during the course of this assessment.

A *controlled recognized environmental condition (CREC)* refers to a REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls. The following was identified during the course of this assessment:

- Partner did not identify any CRECs during the course of this assessment.

A *historical recognized environmental condition (HREC)* refers to a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the property to any required controls. The following was identified during the course of this assessment:

- Partner did not identify any HRECs during the course of this assessment.

An *environmental issue* refers to environmental concerns identified by Partner, which do not qualify as RECs; however, warrant further discussion. The following was identified during the course of this assessment:

- The southeastern portion of the subject property was historically used for agricultural purposes from as early as 1946 until circa-1958. There is a potential that agricultural related chemicals such as pesticides, herbicides, and fertilizers, may have been used and stored onsite. During previous site development activities for the previous residences, near surface soils (where residual agricultural chemical concentrations would have most likely been present, if at all) were generally mixed with fill material or disturbed during grading. Furthermore, it is likely that residual agricultural chemicals (if any) would have likely degraded since the site was last utilized for agricultural purposes (50+ years). These additional variables serve to further reduce the potential for exposure to residual agricultural chemicals (if any). Additionally, Partner did not observe evidence of stressed vegetation throughout the subject property boundaries. Based on these reasons, Partner concludes that the possible former use of agricultural chemicals is not expected to represent a significant environmental concern at this time.

- Based on a review of building records (discussed in Section 4.1.6), the subject property was historically equipped with at least one septic system. Based on the historical residential nature of occupancy, previous on-site septic systems are not expected to represent a significant environmental concern. However, if any septic systems are encountered during future redevelopment activities, Partner recommends the systems be removed and/or abandoned in accordance with applicable regulations.

Conclusions, Opinions and Recommendations

Partner has performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E1527-13 of 29497, 29505, 29547, & 29553 Mission Boulevard in the City of Hayward, Alameda County, California (the "subject property"). Any exceptions to, or deletions from, this practice are described in Section 1.5 of this report.

This assessment has revealed no evidence of RECs in connection with the subject property; however, environmental issues were identified. Based on the conclusions of this assessment, Partner recommends no further investigation of the subject property at this time.

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Attachment V

1.0 INTRODUCTION

Partner Engineering and Science, Inc. (Partner) has performed a Phase I Environmental Site Assessment (ESA) in conformance with the scope and limitations of ASTM Standard Practice E1527-13 and the Environmental Protection Agency Standards and Practices for All Appropriate Inquiries (AAI) (40 CFR Part 312) for the property located at 29497, 29505, 29547, & 29553 Mission Boulevard in the City of Hayward, Alameda County, California (the "subject property"). Any exceptions to, or deletions from, this scope of work are described in the report.

1.1 Purpose

The purpose of this ESA is to identify existing or potential Recognized Environmental Conditions (as defined by ASTM Standard E1527-13) affecting the subject property that: 1) constitute or result in a material violation or a potential material violation of any applicable environmental law; 2) impose any material constraints on the operation of the subject property or require a material change in the use thereof; 3) require clean-up, remedial action or other response with respect to Hazardous Substances or Petroleum Products on or affecting the subject property under any applicable environmental law; 4) may affect the value of the subject property; and 5) may require specific actions to be performed with regard to such conditions and circumstances. The information contained in the ESA Report will be used by Client to: 1) evaluate its legal and financial liabilities for transactions related to foreclosure, purchase, sale, loan origination, loan workout or seller financing; 2) evaluate the subject property's overall development potential, the associated market value and the impact of applicable laws that restrict financial and other types of assistance for the future development of the subject property; and/or 3) determine whether specific actions are required to be performed prior to the foreclosure, purchase, sale, loan origination, loan workout or seller financing of the subject property.

This ESA was performed to permit the *User* to satisfy one of the requirements to qualify for the innocent landowner, contiguous property owner, or bona fide prospective purchaser limitations on scope of Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. §9601) liability (hereinafter, the "*landowner liability protections*," or "*LLPs*"). ASTM Standard E1527-13 constitutes "*all appropriate inquiry* into the previous ownership and uses of the *property* consistent with good commercial or customary practice" as defined at 42 U.S.C. §9601(35)(B).

1.2 Scope of Work

The scope of work for this ESA is in accordance with the requirements of ASTM Standard E1527-13. This assessment included: 1) a property and adjacent site reconnaissance; 2) interviews with key personnel; 3) a review of historical sources; 4) a review of regulatory agency records; and 5) a review of a regulatory database report provided by a third-party vendor. Partner contacted local agencies, such as environmental health departments, fire departments and building departments in order to determine any current and/or former hazardous substances usage, storage and/or releases of hazardous substances on the subject property. Additionally, Partner researched information on the presence of activity and use limitations (AULs) at these agencies. As defined by ASTM E1527-13, AULs are the legal or physical restrictions or limitations on the use of, or access to, a site or facility: 1) to reduce or eliminate potential exposure to hazardous substances or petroleum products in the soil or groundwater on the subject property; or 2) to prevent activities that could interfere with the effectiveness of a response action, in order to ensure maintenance of a condition of no significant risk to public health or the environment. These legal or physical restrictions, which may include institutional and/or engineering controls (IC/ECs), are intended to prevent adverse impacts to individuals or populations that may be exposed to hazardous substances and petroleum products in the soil or groundwater on the property.

If requested by Client, this report may also include the identification, discussion of, and/or limited sampling of asbestos-containing materials (ACMs), lead-based paint (LBP), mold, and/or radon.

1.3 Limitations

Partner warrants that the findings and conclusions contained herein were accomplished in accordance with the methodologies set forth in the Scope of Work. These methodologies are described as representing good commercial and customary practice for conducting an ESA of a property for the purpose of identifying recognized environmental conditions. There is a possibility that even with the proper application of these methodologies there may exist on the subject property conditions that could not be identified within the scope of the assessment or which were not reasonably identifiable from the available information. Partner believes that the information obtained from the record review and the interviews concerning the subject property is reliable. However, Partner cannot and does not warrant or guarantee that the information provided by these other sources is accurate or complete. The conclusions and findings set forth in this report are strictly limited in time and scope to the date of the evaluations. The conclusions presented in the report are based solely on the services described therein, and not on scientific tasks or procedures beyond the scope of agreed-upon services or the time and budgeting restraints imposed by the Client. No other warranties are implied or expressed.

Some of the information provided in this report is based upon personal interviews, and research of available documents, records, and maps held by the appropriate government and private agencies. This report is subject to the limitations of historical documentation, availability, and accuracy of pertinent records, and the personal recollections of those persons contacted.

This practice does not address requirements of any state or local laws or of any federal laws other than the all appropriate inquiry provisions of the LLPs. Further, this report does not intend to address all of the safety concerns, if any, associated with the subject property.

Environmental concerns, which are beyond the scope of a Phase I ESA as defined by ASTM include the following: ACMs, LBP, radon, and lead in drinking water. These issues may affect environmental risk at the subject property and may warrant discussion and/or assessment; however, are considered non-scope issues. If specifically requested by the Client, these non-scope issues are discussed in Section 6.3.

1.4 User Reliance

Meta Housing Corporation engaged Partner to perform this assessment in accordance with an agreement governing the nature, scope and purpose of the work as well as other matters critical to the engagement. All reports, both verbal and written, are for the sole use and benefit of Meta Housing Corporation. Either verbally or in writing, third parties may come into possession of this report or all or part of the information generated as a result of this work. In the absence of a written agreement with Partner granting such rights, no third parties shall have rights of recourse or recovery whatsoever under any course of action against Partner, its officers, employees, vendors, successors or assigns. Any such unauthorized user shall be responsible to protect, indemnify and hold Partner, Client and their respective officers, employees, vendors, successors and assigns harmless from any and all claims, damages, losses, liabilities, expenses (including reasonable attorneys' fees) and costs attributable to such Use. Unauthorized use of this report shall constitute acceptance of and commitment to these responsibilities, which shall be irrevocable and shall apply regardless of the cause of action or legal theory pled or asserted. Additional legal penalties may apply.

This report has been completed under specific Terms and Conditions relating to scope, relying parties, limitations of liability, indemnification, dispute resolution, and other factors relevant to any reliance on this report. Any parties relying on this report do so having accepted the Terms and Conditions for which this report was completed. A copy of Partner's standard Terms and Conditions can be found at http://www.partneresi.com/terms-and-conditions.php.

1.5 Limiting Conditions

The findings and conclusions contain all of the limitations inherent in these methodologies that are referred to in ASTM E1527-13.

Specific limitations and exceptions to this ESA are more specifically set forth below:

- Interviews with past owners, operators and occupants were not reasonably ascertainable and thus constitute a data gap. Based on information obtained from other historical sources (as discussed in Section 3.0), this data gap is not expected to alter the findings of this assessment.
- Partner requested information relative to deed restrictions and environmental liens, and a title search from the Report User. This information was not provided at the time of the assessment. Based on information obtained from other historical sources (as discussed in Section 3.0), this data gap is not expected to alter the findings of this assessment.
- Partner was unable to determine the property use at 5-year intervals, which constitutes a data gap. Except for property tax files and recorded land title records, which were not considered to be sufficiently useful, Partner reviewed all standard historical sources and conducted appropriate interviews.
- Partner's view of the ground during the site assessment was obstructed due to low-lying natural vegetation. Based on information obtained from other historical sources, this limitation is not expected to alter the overall findings of this assessment.

2.0 SITE DESCRIPTION

2.1 Site Location and Legal Description

The subject property at 29497, 29505, 29547, & 29553 Mission Boulevard in Hayward, California is located on the southwest side of Mission Boulevard. According to the Alameda County Assessor, the subject property is identified by the Assessor Parcel Numbers (APNs) 078C-0438-013-06 (Parcel A); 078C-0438-014 (Parcel B); 078C-0438-015-02 (Parcel C); 078C-0438-015-01 (Parcel D). Ownership is currently vested in California Food Managers LLC and Mission Boulevard LLC since September 2015 for Parcel A through C and in the State of California since at least 2004 for Parcel D.

Please refer to Figure 1: Site Location Map, Figure 2: Site Plan, Figure 3: Topographic Map, and Appendix A: Site Photographs for the location and site characteristics of the subject property.

2.2 Current Property Use

The subject property is currently vacant land covered in natural vegetation. No onsite operations are currently conducted at the subject property.

The subject property is designated for sustainable mixed use development by the City of Hayward.

The subject property was not identified in the regulatory database report of Section 4.2.

2.3 Current Use of Adjacent Properties

The subject property is located within a mixed commercial and residential area of Alameda County. During the vicinity reconnaissance, Partner observed the following land use on properties in the immediate vicinity of the subject property:

Immediately Surrounding Properties

North:	Laborers' International Union of North America (29475 Mission Boulevard) to the northwest and Mission Boulevard beyond which is NorCal Tire Pro (29440 and 29444 Mission Boulevard) and Nichiren Buddhist International Center (NBIC) (29490 Mission Boulevard) to the northeast
South:	Red Chili Restaurant and Just Potato Salad (29583 and 29587 Mission Boulevard) to the southeast and Parkway Pines Apartments (418 Industrial Parkway) to the south
East:	Mission Boulevard beyond which is Thrift Center (29498 Mission Boulevard) and Kash Fabrics Inc. and Threading Salon (29576 Mission Boulevard)
West:	Dixon Apartments (29596 Dixon Street) and Cherry Hill Apartments (29596 Dixon Street)

The adjacent property to the east was identified as a Historical Cortese (Hist Cortese) site in the regulatory database report of Section 4.2.

2.4 Physical Setting Sources

2.4.1 Topography

The United States Geological Survey (USGS) *Hayward, California* Quadrangle 7.5-minute series topographic map was reviewed for this ESA. According to the contour lines on the topographic map, the subject property is located at approximately 27 feet above mean sea level (MSL). The contour lines in the area of the subject property indicate the area is sloping gently toward the southwest. No site-specific improvements are depicted on the 2012 topographic map.

A copy of the most recent topographic map is included as Figure 3 of this report.

2.4.2 Hydrology

According to topographic map interpretation, the direction of groundwater in the vicinity of the subject property is inferred to flow toward the southwest. The nearest surface water in the vicinity of the subject property is an unnamed stream located approximately 0.47 miles east-southeast of the subject property. No settling ponds, lagoons, surface impoundments, wetlands or natural catch basins were observed at the subject property during this assessment.

According to available information, a public water system operated by the Hayward Department of Utilities and Environmental Services serves the subject property vicinity. According to the departments website, shallow groundwater beneath the subject property is not utilized for domestic purposes. The sources of public water for the City of Hayward are purchased waters from the San Francisco Public Utilities Commission (SEPUC). The SEPUC obtains the majority of this water from the Hetch Hetchy watershed, from snow melt that runs down the Tuolumne River. In addition, a small amount of water is obtained from the Alameda watershed, specifically from surface waters of the Calaveras and the San Antonio Reservoirs and from groundwater from the Sunol Filter Galleries.

According to a previous subsurface investigation conducted on a nearby property (29705 Mission Boulevard, San Francisco Bay RWQCB Case Number 01S0726), the depth of groundwater in the vicinity of the subject property is inferred to be approximately 8 to 25 feet below ground surface (bgs).

2.4.3 Geology/Soils

The subject property is situated within the Coast Range physiographic province of the State of California. The relatively low elevation mountain ranges and associated valleys of the Coast Ranges trend toward the northwest. The Coast Ranges are bordered by the Klamath Mountains to the north, the Transverse Ranges to the south, the Great Valley to the east, and the Pacific Ocean to the west. The province is generally composed of thick late Mesozoic and Cenozoic sedimentary rocks. Locally, the geology is dominated by Pleistocene marine and non-marine sedimentary rocks composed of alluvium, lake, and terrace deposits.

Based on information obtained from the USDA Natural Resources Conservation Service Web Soil Survey online database, the subject property is mapped as Rincon clay loam. The Rincon series consists of deep, well drained soils that formed from alluvium derived from sedimentary rock on alluvial fans and terraces. A typical soil profile consists of clay loam to a depth of 12 inches bgs, clay to a depth of 29 inches bgs, silty clay loam to a depth of 38 inches bgs, and loam to a depth of 79 inches bgs.

2.4.4 *Flood Zone Information*

Partner performed a review of the Flood Insurance Rate Map, published by the Federal Emergency Management Agency. According to Community Panel Number 06001C0293G, dated August 3, 2009, the subject property appears to be located in Zone X, an area located outside of the 100-year and 500-year flood plains.

3.0 HISTORICAL INFORMATION

Partner obtained historical use information about the subject property from a variety of sources. A chronological listing of the historical data found is summarized in the table below:

Historical Use Information

Period/Date	Source	Description/Use
1899-1915	Topographic Maps	Undeveloped/Unimproved
1939-1946	Aerial Photographs, Topographic Maps	Residential
1946-1963	Aerial Photographs, Topographic Maps, City Directories	Residential and Agriculture
1966-2002	Aerial Photographs, Building Records, City Directories	Residential
2002-Present	Aerial Photographs, Building Records, City Directories, Onsite Observations	Vacant Land

The subject property was historically developed with residences on the northeast side of the property from as early as 1939. The southeastern portion of the subject property appears to have been utilized for agricultural purposes from as early as 1946 until circa-1958. By 1982, all residential structures except one remaining residence were removed from the subject property. In 2002, the remaining residential structure was demolished, and the subject property has remained vacant land since that time.

The southeastern portion of the subject property was historically used for agricultural purposes from as early as 1946 until circa-1958. There is a potential that agricultural related chemicals such as pesticides, herbicides, and fertilizers, may have been used and stored onsite. During previous site development activities for the previous residences, near surface soils (where residual agricultural chemical concentrations would have most likely been present, if at all) were generally mixed with fill material or disturbed during grading. Furthermore, it is likely that residual agricultural chemicals (if any) would have likely degraded since the site was last utilized for agricultural purposes (50+ years). These additional variables serve to further reduce the potential for exposure to residual agricultural chemicals (if any). Additionally, Partner did not observe evidence of stressed vegetation throughout the subject property boundaries. Based on these reasons, Partner concludes that the possible former use of agricultural chemicals is not expected to represent a significant environmental concern at this time.

Attachment V

3.1 Aerial Photograph Review

Partner obtained available aerial photographs of the subject property and surrounding area from Environmental Data Resources (EDR) on February 14, 2018. The following observations were noted to be visible on the subject property and adjacent properties during the aerial photograph review:

Date: 1939	***Scale: 1"=500'***
Subject Property:	Developed with what appears to be at least two residential buildings
North:	Appears to be developed with a residence to the northwest and with an improved road beyond which is developed with orchards to the northeast
South:	Appears to be developed with a residence and a small orchard to the southeast and undeveloped land to the south
East:	Appears to be developed with orchards across an improved road
West:	Appears to be undeveloped land

Date: 1946	***Scale: 1"=500'***
Subject Property:	Appears to be developed with at least three residences to the northeast of the property and agricultural land to the southwest
North:	Appears to be developed with agricultural land to the northwest beyond the prior residence and no other significant changes
South:	Appears to be developed with agricultural land to the southeast and no other significant changes
East:	No significant changes visible
West:	Appears to be developed with agricultural land to the northwest and no other significant changes

Date: 1958	***Scale: 1"=500'***
Subject Property:	No significant changes visible
North:	Prior residence appears to have been demolished; appears to be developed with a new residence slightly south of where the prior residence was; orchard to the northeast appears to have been removed and the land left vacant with the exception of a building to the north
South:	No significant changes visible
East:	Prior orchard appears to have been somewhat cleared back away from the road; a commercial building appears to have been developed on a portion of the cleared land, with the rest remaining vacant
West:	No significant changes depicted

Date: 1963	***Scale: 1"=500'***
Subject Property:	Appears to have been further developed with another residence, with all four dwellings boarding the northeast property line along the road
North:	Prior vacant land to the northeast appears to be graded for construction across a further expanded improved road, Mission Boulevard; Appears to have been further developed with an agricultural related structure to the northwest
South:	Prior small orchard appears to have been cleared and developed with a large commercial building; no other significant changes

Attachment V

***Date:* 1963** ***Scale:* 1"=500'**

East:	Prior vacant land appears to be graded for construction across an expanded improved road, Mission Boulevard
West:	No significant changes visible

***Date:* 1966** ***Scale:* 1"=500'**

Subject Property:	Appears that at least two of the prior residences have been demolished and the land left vacant on the northeast side of the subject property; Appears the land used for agricultural purposes on the southwest portion of the property has also been left as vacant land
North:	Appears to be further developed with a commercial building and a parking lot to the northeast across Mission Boulevard
South:	Appears to be developed with multiple apartments and no other significant changes
East:	No significant changes visible
West:	Appears to be developed with apartments

***Date:* 1974, 1979** ***Scale:* 1"=500'**

Subject Property:	No significant changes visible
North:	Prior residence and agricultural related buildings appear to have been demolished with the exception of one remaining structure to the northeast; no other significant changes visible
South:	No significant changes visible
East:	No significant changes visible
West:	No significant changes visible

***Date:* 1982** ***Scale:* 1"=500'**

Subject Property:	Another prior residence appears to have been demolished and the land left vacant
North:	Prior residence appears to have been demolished and has been redeveloped as a paved parking lot and a large commercial building; no other significant changes
South:	No significant changes visible
East:	Prior vacant land, across Mission Boulevard, appears to have been developed with a large commercial building
West:	No significant changes visible

***Date:* 1993, 1998** ***Scale:* 1"=500'**

Subject Property:	No significant changes visible
North:	No significant changes visible
South:	No significant changes visible
East:	No significant changes visible
West:	Appears to be developed with multiple apartments

***Date:* 2006, 2010** ***Scale:* 1"=500'**

Subject Property:	Remaining residence appears to have been demolished and the entire lot remains as vacant land; property appears as it does today
North:	No significant changes visible
South:	No significant changes visible

Attachment V

Date: ***2006, 2010***	***Scale:*** ***1"=500'***
East:	No significant changes visible
West:	No significant changes visible

Copies of select aerial photographs are included in Appendix B of this report.

3.2 Fire Insurance Maps

Partner reviewed the collection of Sanborn Fire insurance maps from EDR on February 14, 2018. Sanborn map coverage was not available for the subject property.

A copy of the certified no coverage letter is included in Appendix B of this report.

3.3 City Directories

Partner reviewed historical city directories obtained from EDR on February 14, 2018 for past names and businesses that were listed for the subject property and adjacent properties. The findings are presented in the following table:

City Directory Search for 29497, 29505, 29547, & 29553 Mission Boulevard (Subject Property)

Year(s)	Occupant Listed
1965	Residential (29547 and 29553 Mission Boulevard)
1970	Residential (29547 and 29553 Mission Boulevard)
1976	Residential (29553 Mission Boulevard)
1992	Residential (29553 Mission Boulevard)
2002	Residential (29553 Mission Boulevard)

Based on the city directory review, no environmentally sensitive listings were identified for the subject property addresses.

City Directory Search for Adjacent Properties

Year(s)	Occupant Listed
1959	*North:* No listings *South:* No listings *East:* No listings *West:* Residential (29536 Dixon Street)
1960	*North:* No listings *South:* No listings *East:* No listings *West:* Residential (29596 Mission Boulevard); Residential (29536 Dixon Street)
1965	*North:* Capecod Nursery (29475 Mission Boulevard); Blue Chip Redemption Store (29490 Mission Boulevard) *South:* Valle Vista Grocery (29583 Mission Boulevard); Residential- Several (418 Industrial Parkway) *East:* Casserlys Maple Furniture (29576 Mission Boulevard); Gay Ninety's Pizza (29587 Mission Boulevard) *West:* Parkway Manor Apartments, Residential- several (29596 Dixon Street); Residential (29536 Dixon Street)

Attachment V

City Directory Search for Adjacent Properties

Year(s)	Occupant Listed
1970	*North:* Capecod Nursery (29475 Mission Boulevard); Blue Chip Redemption Store (29490 Mission Boulevard) *South:* Valle Vista Grocery (29583 Mission Boulevard); Gay Ninety's Pizza (29587 Mission Boulevard); Parkway Pines Apartments (418 Industrial Parkway) *East:* Casserlys Maple Furniture (29576 Mission Boulevard) *West:* Parkway Manor Apartments, Residential- several (29596 Dixon Street); Residential (29536 Dixon Street)
1973	*North:* Blue Chip Redemption Store (29490 Mission Boulevard) *South:* Johnny Quick Market Hayward (29583 Mission Boulevard); Gay Ninety's Pizza (29587 Mission Boulevard); Parkway Pines Apartments (418 Industrial Parkway) *East:* Guys Freight Salvage Co (29576 Mission Boulevard) *West:* Residential- several (29596 Dixon Street); Residential (29536 Dixon Street)
1975	*North:* Blue Chip Redemption Store (29490 Mission Boulevard) *South:* No listings *East:* No listings *West:* No listings
1976	*North:* Vacant (29490 Mission Boulevard) *South:* Nomuras Market (29583 Mission Boulevard); Gay Ninety's Pizza (29587 Mission Boulevard); Parkway Pines Apartments (418 Industrial Parkway) *East:* Vacant; Guys Freight Salvage Co (29576 Mission Boulevard) *West:* Parkway Manor Apartments, Residential- several (29596 Dixon Street); Residential (29536 Dixon Street)
1979	*North:* Hotel Motel Restaurant Employees and bartenders Union (29475 Mission Boulevard) *South:* Gay Ninety's Pizza (29587 Mission Boulevard); Parkway Pines Apartments (418 Industrial Parkway) *East:* H&S Cycle Warehouse, LBC Leathers (29576 Mission Boulevard) *West:* Residential- several (29596 Dixon Street); Residential (29536 Dixon Street)
1982	*North:* Hotel Employees and Restaurant Employees Local 20, Hotel Motel Restaurant Employees and bartenders Union (29475 Mission Boulevard); Morning light industries (29444 Mission Boulevard *South:* Nomuras Market Hayward (29583 Mission Boulevard); Gay Ninety's Pizza (29587 Mission Boulevard); Residential- several (418 Industrial Parkway) *East:* *West:* Residential- several (29596 Dixon Street); Residential (29536 Dixon Street)
1991	*North:* **Morning Star Printing Systems**, Morning Star Outreach (29444 Mission Boulevard) *South:* No listings *East:* No listings *West:* No listings
1992	*North:* Laborers Union Local 304/Construction & General Laborer Union (29475 Mission Boulevard); Morning Star Outreach (29444 Mission Boulevard); J M Cooper INC (29490 Mission Boulevard) *South:* New Green Pine Restaurant (29583 Mission Boulevard); California Pizza (29587 Mission Boulevard) *East:* United Cerebral Palsy Associated, Hayward Thrift Center (29498 Mission Boulevard);

City Directory Search for Adjacent Properties

Year(s)	Occupant Listed
	H&S Cycle Warehouse, Haywards Cards and Collectibles (29576 Mission Boulevard) *West:* No listings
2002	*North:* Laborers Union Local 304/Construction & General Laborer Union (29475 Mission Boulevard); Casaticoai Outreach, Morning Star Outreach (29444 Mission Boulevard); Nichiren Buddhist International Center (29490 Mission Boulevard) *South:* Newgreen Pine Restaurant, Shomwal (29583 Mission Boulevard); California Pizza (29587 Mission Boulevard); Apartments AXLW, **Rainbow Cleaners** (418 Industrial Parkway) *East:* Thrift Center (29498 Mission Boulevard); No listing (29576 Mission Boulevard) *West:* Dixon Townhouse Apartments (29596 Dixon Street); Apartments, CastelBerry (29536 Dixon Street)
2010	*North:* Laborers Union Local 304/Construction & General Laborer Union (29475 Mission Boulevard); Western Tire Inc (29440 Mission Boulevard); Nichiren Buddhist International Center (29490 Mission Boulevard) *South:* Pho Quyen Noodle House, Red Chile Restaurant, New Mother India Restaurant (29583 Mission Boulevard); Big Bite Pizza (29587 Mission Boulevard) *East:* United Cerebral Palsy Associated, Hayward Thrift Center (29498 Mission Boulevard); Kash Fabrics Inc (29576 Mission Boulevard) *West:* Dixon Townhouse Apartments (29596 Dixon Street); Cherry Hill Apartments (29536 Dixon Street)
2014	*North:* Laborers Union Local 304/Construction & General Laborer Union (29475 Mission Boulevard); Norcal Tire and Wheel Inc (29440 Mission Boulevard); Nichiren Buddhist International Center (29490 Mission Boulevard) *South:* Pho Quyen Noodle House, Red Chile Restaurant (29583 Mission Boulevard); Olomi Enterprises Inc (29587 Mission Boulevard) *East:* United Cerebral Palsy Associated, Hayward Thrift Center (29498 Mission Boulevard); Kash Fabrics Inc (29576 Mission Boulevard) *West:* Dixon Townhouse Apartments (29596 Dixon Street); Cherry Hill Apartments (29536 Dixon Street)

According to the city directory review, the adjacent property to the south has been occupied by Rainbow Cleaners. According to the regulatory databases and regulatory records, this business actually occupied a non-adjacent now-demolished building; however, because this business is less than 1,760 feet away and has an open chlorinated solvent release case, this property is further discussed in Section 4.2.4. Morning Star Printing Systems, listed only in 1991, occupied an adjacent building to the northeast, across Mission Boulevard. It appears to be associated with Morning Star/Light Outreach, which is listed from 1982 to 2002 and, after a cursory internet search, appears to be a religious organization for abused children. No further information was found on the nature of the listing. Based on the nature and small quantity of wastes typically associated with retail printing facilities and the lack of reported spills or releases, this listing is not expected to represent a significant environmental concern.

Copies of reviewed city directories are included in Appendix B of this report.

Attachment V

3.4 Historical Topographic Maps

Partner reviewed historical topographic maps obtained from EDR on February 14, 2018. The following observations were noted to be depicted on the subject property and adjacent properties during the topographic map review:

Date:	*1899, 1915*
Subject Property:	Undeveloped/unimproved
North:	Undeveloped/unimproved across an improved road
South:	Undeveloped/unimproved
East:	Undeveloped/unimproved across an improved road
West:	Undeveloped/unimproved

Date:	*1947, 1948, 1950*
Subject Property:	Depicted as being developed with three structures
North:	Depicted as being developed with a structure and no other significant changes depicted across the improved road, now labeled as Castro Street/Niles Road
South:	Appears developed with multiple structures to the southeast
East:	Depicted as shaded to represent woodland
West:	No significant changes depicted

Date:	*1959*
Subject Property:	Depicted as being developed with another structure
North:	Depicted as being developed with two structures across what is now labeled as Mission Boulevard
South:	No significant changes depicted
East:	Depicted as developed with a large structure across Mission Boulevard
West:	No significant changes depicted

Date:	*1968, 1973*
Subject Property:	Depicted as shaded to represent a built-up area; All but one of the prior structures are no longer depicted
North:	Depicted as shaded to represent a built-up area
South:	Depicted as shaded to represent a built-up area and no other significant changes
East:	Depicted as developed with a large structure across Mission Boulevard
West:	Depicted as shaded to represent a built-up area

Date:	*1980*
Subject Property:	No significant changes depicted
North:	No significant changes depicted
South:	No significant changes depicted
East:	No significant changes depicted
West:	Appears to be developed with roads

Date:	***1996, 2012***
Subject Property:	No improvements depicted
North:	No improvements depicted with the exception of roadways
South:	No improvements depicted with the exception of roadways
East:	No improvements depicted with the exception of roadways
West:	No improvements depicted with the exception of roadways

Copies of reviewed topographic maps are included in Appendix B of this report.

4.0 REGULATORY RECORDS REVIEW

4.1 Regulatory Agencies

4.1.1 Health Department

Regulatory Agency Data	
Name of Agency:	Alameda County Environmental Health Department (ACEHD)
Point of Contact:	https://www.acgov.org/aceh/hazard/index.htm
Agency Address:	1131 Harbor Bay Parkway, Alameda, California
Agency Phone Number:	(510) 567-6700
Date of Contact:	February 14, 2018
Method of Communication:	Online
Summary of Communication:	No records regarding hazardous substance use, storage or releases, or the presence of USTs and AULs on the subject property were on file with the ACEHD. According to the ACEHD CUPA webpage, the City of Hayward does not fall within their jurisdiction and the Hayward Fire Department serves as the CUPA Agency, as discussed in Section 4.1.2.

4.1.2 Fire Department

Regulatory Agency Data	
Name of Agency:	Hayward Fire Department (HFD)
Point of Contact:	Hugh Murphy
Agency Address:	777 B Street, Hayward, California
Agency Phone Number:	(510) 583-4900
Date of Contact:	February 14, 2018
Method of Communication:	Online/Telephone
Summary of Communication:	No records regarding hazardous substance use, storage or releases, or the presence of USTs and AULs on the subject property were on file with the HFD.

4.1.3 Air Pollution Control Agency

Regulatory Agency Data	
Name of Agency:	Bay Area Air Quality Management District (BAAQMD)
Point of Contact:	Rochelle Reed
Agency Address:	375 Beale Street, Suite 600, San Francisco, California
Agency Phone Number:	(415) 749-5000
Date of Contact:	February 14, 2018
Method of Communication:	Online
Summary of Communication:	No Permits to Operate (PTO), Notices of Violation (NOV), or Notices to Comply (NTC) or the presence of AULs, dry cleaning machines, or USTs were on file for the subject property with the BAAQMD.

4.1.4 Regional Water Quality Agency

Regulatory Agency Data

Name of Agency:	San Francisco Regional Water Quality Control Board (SFRWQCB)
Point of Contact:	http://geotracker.waterboards.ca.gov/ (GeoTracker)
Agency Address:	1515 Clay Street, San Francisco, California
Agency Phone Number:	(510) 622-2300
Date of Contact:	February 14, 2018
Method of Communication:	Online
Summary of Communication:	No records regarding hazardous substance use, storage or releases, or the presence of USTs and AULs on the subject property were on file with the SFRWQCB.

4.1.5 Department of Toxic Substances Control

Regulatory Agency Data

Name of Agency:	California Department of Toxic Substances Control (DTSC)
Point of Contact:	https://www.envirostor.dtsc.ca.gov/public/ (EnviroStor)
Agency Address:	700 Heinz Avenue, Berkeley, California
Agency Phone Number:	(510) 540-2122
Date of Contact:	February 14, 2018
Method of Communication:	Online
Summary of Communication:	No records regarding hazardous substance use, storage or releases, or the presence of USTs and AULs on the subject property were on file with the DTSC.

4.1.6 Building Department

Regulatory Agency Data

Name of Agency:	Hayward Building Division (HBD)
Point of Contact:	Self-Serve Kiosk
Agency Address:	777 B Street, Hayward, California
Agency Phone Number:	(510) 583-4140
Date of Contact:	February 26, 2018
Method of Communication:	In Person
Summary of Communication:	Records were available for review, as further discussed in the following table.

Building Records Reviewed for 29497, 29505, 29547, & 29553 Mission Boulevard (Subject Property) and historical addresses

Year(s)	Owner/Applicant	Description
1955	Norbert J. Brown	Application to build a single-family dwelling (29553 Mission Boulevard)
1955	Norbert Brown	Application to demolish a garage (29553 Mission Boulevard)
1959	Audrey Roth	Install 6-inch building court main to serve two dwellings (29497 and 29505 Mission Boulevard)
1965	Audrey Roth	Demolish dwelling and other structures (29505 Mission Boulevard)

Building Records Reviewed for 29497, 29505, 29547, & 29553 Mission Boulevard (Subject Property) and historical addresses		
Year(s)	**Owner/Applicant**	**Description**
1965	Audrey Roth	Demolish dwelling and other structures (29497 Mission Boulevard)
1966	Audrey Roth	Connect temporary sanitary sewer; existing septic tank shall be abandoned and filled with sand or removed (29547 Mission Boulevard)
1971/1973	Audrey Roth	Application to build two single-story 9,000-SF structures for a commercial retail/office complex, which was conditionally approved but never completed (29497 Mission Boulevard)
1996	Audrey Collier	Building permit for signs on the property for an offsite subdivision (29547 Mission Boulevard)
2000	Norbert & Edna Brown	Rental program and & log sheet
2000	Norbert & Edna Brown	Electrical Permit
2002	Norbert & Edna Brown	Demolition permit for burned house (29553 Mission Boulevard)
2002	Not listed	Notice from PG&E that electrical services have been removed and gas service lines removed and capped at property lines (29553 Mission Boulevard)
2002	Not listed	Notice from BAAQMD acknowledging asbestos removal/demolition plan (29553 Mission Boulevard)

4.1.7 Planning Department

Regulatory Agency Data	
Name of Agency:	Hayward Planning Division (HPD)
Point of Contact:	Self-Serve Kiosk
Agency Address:	777 B Street, Hayward, California
Agency Phone Number:	(510) 583-4140
Date of Contact:	February 26, 2018
Method of Communication:	In Person
Summary of Communication:	According to records reviewed, the subject property is zoned S-T5: Urban Center Zone-35 to 55 Units/Net Acre for sustainable mixed use development by the City of Hayward.

4.1.8 Oil & Gas Exploration

Regulatory Agency Data	
Name of Agency:	California Division of Oil, Gas and Geothermal Resources (DOGGR)
Point of Contact:	https://maps.conservation.ca.gov/doggr/wellfinder/
Agency Address:	801 K Street, Sacramento, California
Agency Phone Number:	(916) 322-1080
Date of Contact:	February 14, 2018
Method of Communication:	Online
Summary of Communication:	According to DOGGR, no oil or gas wells are located on or adjacent to the subject property.

4.1.9 *Assessor's Office*

Regulatory Agency Data	
Name of Agency:	Alameda County Assessor (ACA)
Point of Contact:	https://www.acgov.org/assessor/resources/assessment-information.htm
Agency Address:	121 Oak Street, Oakland, California
Agency Phone Number:	(510) 272-3787
Date of Contact:	February 14 and 28, 2018
Method of Communication:	Telephone/Online
Summary of Communication:	According to records reviewed, the subject property is identified by the Assessor Parcel Numbers (APNs) 078C-0438-013-06 (Parcel A); 078C-0438-014 (Parcel B); 078C-0438-015-02 (Parcel C); 078C-0438-015-01 (Parcel D). Ownership is currently vested in California Food Managers LLC and Mission Boulevard LLC since September 2015 for Parcel A through C and in the State of California since at least 2004 for Parcel D. The property is currently vacant and is approximately 2.01 acres.

4.2 Mapped Database Records Search

Information from standard federal, state, county, and city environmental record sources was provided by Environmental Data Resources, Inc. (EDR). Data from governmental agency lists are updated and integrated into one database, which is updated as these data are released. The information contained in this report was compiled from publicly available sources and the locations of the sites are plotted utilizing a geographic information system, which geocodes the site addresses. The accuracy of the geocoded locations is approximately +/-300 feet.

Using the ASTM definition of migration, Partner considers the migration of hazardous substances or petroleum products in any form onto the subject property during the evaluation of each site listed on the radius report, which includes solid, liquid, and vapor.

4.2.1 *Regulatory Database Summary*

Radius Report Data

Database	**Search Radius (mile)**	**Subject Property**	**Adjacent Properties**	**Sites of Concern**
Federal NPL or Delisted NPL Site	1.00	N	N	N
Federal CERCLIS Site	0.50	N	N	N
Federal CERCLIS-NFRAP Site	0.50	N	N	N
Federal RCRA CORRACTS Facility	1.00	N	N	N
Federal RCRA TSDF Facility	0.50	N	N	N
Federal RCRA Generators Site (LQG, SQG, CESQG)	0.25	N	N	**Y**
Federal IC/EC Registries	0.50	N	N	N
Federal ERNS Site	Subject Property	N	N	N
State/Tribal Equivalent NPL	1.00	N	N	N

Radius Report Data

Database	Search Radius (mile)	Subject Property	Adjacent Properties	Sites of Concern
State/Tribal Equivalent CERCLIS	1.00	N	N	N
State/Tribal Landfill/Solid Waste Disposal Site	0.50	N	N	N
State/Tribal Leaking Storage Tank Site	0.50	N	N	**Y**
State/Tribal Registered Storage Tank Sites (UST/AST)	0.25	N	N	N
State/Tribal Voluntary Cleanup Sites (VCP)	0.50	N	N	N
State/Tribal Spills	0.50	N	N	N
Federal Brownfield Sites	0.50	N	N	N
State Brownfield Sites	0.50	N	N	N
EDR MGP	Varies	N	N	N
EDR US Hist Auto Station	Varies	N	N	**Y**
EDR US Hist Cleaners	Varies	N	N	**Y**
Historical Cortese (HIST Cortese)	0.50	N	**Y**	**Y**
Enforcement and Compliance History Information (ECHO)	Varies	N	N	**Y**
California Facility Inventory Database (CA FID UST)	0.25	N	N	**Y**
Cleanup Program Sites (SLIC)	0.50	N	N	**Y**
Alameda County Contaminated Sites (Alameda Co CS)	0.50	N	N	**Y**
Historical Underground Storage Tank Registered Database (HIST UST)	0.25	N	N	**Y**

4.2.2 Subject Property Listings

The subject property is not identified in the regulatory database report.

4.2.3 Adjacent Property Listings

The adjacent property to the east is identified as a Historical Cortese site in the regulatory database report, as discussed below:

- The property, identified as Thrift Center at 29498 Mission Boulevard, is located adjacent to the east of the subject property. This site is reported as being a Historical Cortese Site. No other information is provided. This database is no longer updated. Based on the nature of the site, a secondhand retail shop, and the lack of any reported spills or releases, this site is not expected to represent a significant environmental concern.

Based on the findings, vapor migration is not expected to represent a significant environmental concern at this time.

4.2.4 Sites of Concern Listings

The properties to the south-southeast are identified in the regulatory database report, as discussed below:

- The property, identified as Beacon Station and Hayward Golf Service at 29705 Mission Boulevard, is located approximately 0.08-mile to the south-southeast of the subject property, and situated hydrologically cross-gradient. This site is listed in the LUST, SWEEPS UST, CA FID UST, HIST CORTESE, SLIC, ALAMEDO CO CS, HIST UST, and EDR HIST AUTO Databases. According to the databases, this site originally reported a release in 1988 that occurred as a result of a tanks structural failure. According to documents obtained from GeoTracker, four USTs (two gasoline, one diesel and one waste oil) and 25 feet of impacted soil were removed from the property in 1998. In 1996, three additional USTs of unknown content were removed, as well as approximately 305 cubic yards of impacted soil. An unauthorized release occurred on-site in October 1997 and groundwater extraction occurred as part of remediation efforts. In November 1998, the site was granted a NFA by Alameda County. In 2002, site assessment resumed when soil and groundwater impacts downgradient were identified. In May 2012, the case was officially reopened by the City of Hayward and oversight was transferred to the Regional Water Board and remedial actions resumed. In July 2017, the San Francisco Regional Water Quality Control Board issued a Notice of Intent to Issue a No Further Action Letter as the site, after remedial efforts, meets Low-Threat Case Closure Policy. In September 2017, the State Water Board concurred and summarized that groundwater plume of contaminant is less than 100 feet in length, contains no free product, and is not likely to contaminate any water supply wells; soil gas samples showed that benzene and ethylbenzene were below environmental screening levels (ESLs) and vapor is not expected to represent a concern to human health; and finally, maximum levels of benzene, ethylbenzene, and naphthalene in soil meet ESLs for commercial and industrial sites. As of the date of this report, GeoTracker has not been updated to reflect an issuance of an NFA and the case is still listed as 'Open'. Based on the remedial actions, distance of the impacted-soil to the subject property boundary, and the regulatory oversight/pending NFA status, this listing is not expected to represent a significant environmental concern.

- The property, identified as Joseph Cleaners and Rainbow Cleaners at 427 Industrial Parkway, is located approximately 0.08-mile to the south-southeast of the subject property, and situated hydrologically cross-gradient. This site appears on the EDR HIST CLEANER, FINDS, RCRA-SQG, and ECHO database, as well as on an adjacent SLIC database listing. According to the databases, this site was occupied by a drycleaner from at least 1976 to 2014 and has an open investigation for Tetrachloroethylene (PCE) contamination. According to GeoTracker documents, a Phase I Assessment for an adjacent property recommended a subsurface investigation to evaluate whether soil, soil gas, and groundwater beneath the property had been impacted by the historical use and development associated with an automotive service station and dry-cleaning operations. The investigation concluded that there was no evidence of a major release of PCE to soil or groundwater, however the sampling data suggests that a minor release had likely occurred inside the building which may warrant soil removal. Soil, soil vapor, and groundwater sampling was further conducted to find the extent of the PCE Plume. As a result of the sampling, soil venting, excavation and off-site disposal, and soil vapor extraction were recommended as remedial actions. As of the date of this report, the building in which the drycleaner was located has been demolished and soil has been aerated. Remedial actions are still occurring and this case is ongoing. Based on the distance of the contamination plume to the subject property boundary and the regulatory oversight, this listing is not expected to represent a significant environmental concern.

Based on the findings, vapor migration is not expected to represent a significant environmental concern at this time.

4.2.5 Orphan Listings

No orphan listings of concern are identified in the regulatory database report.

A copy of the regulatory database report is included in Appendix C of this report.

5.0 USER PROVIDED INFORMATION AND INTERVIEWS

In order to qualify for one of the *Landowner Liability Protections (LLPs)* offered by the Small Business Liability Relief and Brownfields Revitalization Act of 2001 (the *Brownfields Amendments*), the *User* must conduct the following inquiries required by 40 CFR 312.25, 312.28, 312.29, 312.30, and 312.31. The *User* should provide the following information to the *environmental professional.* Failure to provide this information could result in a determination that *all appropriate inquiries* is not complete. The *User* is asked to provide information or knowledge of the following:

- Review Title and Judicial Records for Environmental Liens and AULs
- Specialized Knowledge or Experience of the User
- Actual Knowledge of the User
- Reason for Significantly Lower Purchase Price
- Commonly Known or *Reasonably Ascertainable* information
- Degree of Obviousness
- Reason for Preparation of this Phase I ESA

Fulfillment of these user responsibilities is key to qualification for the identified defenses to CERCLA liability. Partner requested our Client to provide information to satisfy User Responsibilities as identified in Section 6 of the ASTM guidance.

Pursuant to ASTM E1527-13, Partner requested the following site information from Meta Housing Corporation (User of this report).

User Responsibilities

Item	Provided By User	Not Provided By User	Discussed Below	Does Not Apply
Environmental Pre-Survey Questionnaire			X	
Title Records, Environmental Liens, and AULs			X	
Specialized Knowledge			X	
Actual Knowledge			X	
Valuation Reduction for Environmental Issues			X	
Identification of Key Site Manager	**Section 5.1.3**			
Reason for Performing Phase I ESA	**Section 1.1**			
Prior Environmental Reports		X		
Other		X		

5.1 Interviews

5.1.1 Interview with Owner

Ms. Andrea Lau, subject property owner representative, was not aware of any pending, threatened, or past litigation relevant to hazardous substances or petroleum products in, on, or from the subject property; any pending, threatened, or past administrative proceedings relevant to hazardous substances or petroleum products in, on, or from the subject property; or any notices from a governmental entity regarding any possible violation of environmental laws or possible liability relating to hazardous substances or petroleum products.

According to Ms. Lau, the subject property is approximately 2.2 acres and is currently vacant land. Ms. Lau further stated that there are no USTs, ASTs, clarifiers, oil/water separators, groundwater monitoring wells, or hazardous substance use/storage/generation on the subject property to the best of her knowledge.

5.1.2 Interview with Report User

Please refer to Section 5.2 below for information requested from the Report User.

5.1.3 Interview with Key Site Manager

Ms. Lau is identified as the Key site manager as well.

5.1.4 Interviews with Past Owners, Operators and Occupants

Interviews with past owners, operators and occupants were not conducted since information regarding the potential for contamination at the subject property was obtained from other sources.

5.1.5 Interview with Others

As the subject property is not an abandoned property as defined in ASTM 1527-13, interview with others were not performed.

5.2 User Provided Information

5.2.1 Title Records, Environmental Liens, and AULs

Partner was not provided with title records or environmental lien and AUL information for review as part of this assessment.

5.2.2 Specialized Knowledge

The User did not have specialized knowledge of environmental conditions associated with the subject property at the time of the assessment.

5.2.3 Actual Knowledge of the User

The User was not aware of environmental liens and/or AULs encumbering the subject property or in connection with the subject property at the time of the assessment.

5.2.4 Valuation Reduction for Environmental Issues

The User was not aware of any reductions in property value due to environmental issues.

5.2.5 Commonly Known or Reasonably Ascertainable Information

The User did not provide information that is commonly known or *reasonably ascertainable* within the local community about the subject property at the time of the assessment.

5.2.6 Previous Reports and Other Provided Documentation

No previous reports or other pertinent documentation was provided to Partner for review during the course of this assessment.

6.0 SITE RECONNAISSANCE

The weather at the time of the site visit was sunny with clouds. Refer to Section 1.5 for limitations encountered during the field reconnaissance and Sections 2.1 and 2.2 for subject property operations. The table below provides the site assessment details:

Site Assessment Data	
Site Assessment Performed By:	Bailey Balshor
Site Assessment Conducted On:	February 26, 2018

Partner was unaccompanied during the field reconnaissance.

No potential environmental concerns were identified during the onsite reconnaissance.

6.1 General Site Characteristics

6.1.1 Solid Waste Disposal

Solid waste is not currently generated at the subject property. Partner observed small quantities of inert debris and trash on the subject property; however, no indications of hazardous substances were noted in the debris piles.

6.1.2 Sewage Discharge and Disposal

Sanitary discharges are not currently produced on the subject property. No wastewater treatment facilities or septic systems are observed or reported on the subject property, with the exception of a former septic tank discussed further in Section 4.1.6.

6.1.3 Surface Water Drainage

Storm water is removed from the subject property primarily by percolation into the ground surface.

The subject property does not appear to be a designated wetland area, based on information obtained from the United States Fish & Wildlife Service; however, a comprehensive wetlands survey would be required in order to formally determine actual wetlands on the subject property. No surface impoundments, wetlands, natural catch basins, settling ponds, or lagoons are located on the subject property. No drywells were identified on the subject property.

6.1.4 Source of Heating and Cooling

Heating and cooling systems are not currently present at the subject property.

6.1.5 Wells and Cisterns

No aboveground evidence of wells or cisterns was observed during the site reconnaissance.

6.1.6 Wastewater

Domestic wastewater is not generated at the subject property. No industrial process is currently performed at the subject property.

6.1.7 Septic Systems

No septic systems were observed on the subject property; however, based on a review of building records (discussed in Section 4.1.6), the subject property was historically equipped with at least one septic system. Based on the historical residential nature of occupancy, previous on-site septic systems are not expected to represent a significant environmental concern. However, if any septic systems are encountered during future redevelopment activities, Partner recommends the systems be removed and/or abandoned in accordance with applicable regulations.

6.1.8 Additional Site Observations

No additional general site characteristics were observed during the site reconnaissance.

6.2 Potential Environmental Hazards

6.2.1 Hazardous Substances and Petroleum Products Used or Stored at the Site

No hazardous substances or petroleum products were observed on the subject property during the site reconnaissance.

6.2.2 Aboveground & Underground Hazardous Substance or Petroleum Product Storage Tanks (ASTs/USTs)

No evidence of current or former ASTs or USTs was observed during the site reconnaissance.

6.2.3 Evidence of Releases

No spills, stains or other indications that a surficial release has occurred at the subject property were observed.

6.2.4 Polychlorinated Biphenyls (PCBs)

No potential PCB-containing equipment (transformers, oil-filled switches, hoists, lifts, dock levelers, hydraulic elevators, etc) was observed on the subject property during Partner's reconnaissance.

6.2.5 Strong, Pungent or Noxious Odors

No strong, pungent or noxious odors were evident during the site reconnaissance.

6.2.6 Pools of Liquid

No pools of liquid were observed on the subject property during the site reconnaissance.

6.2.7 Drains, Sumps and Clarifiers

No drains, sumps, or clarifiers, other than those associated with storm water removal, were observed on the subject property during the site reconnaissance.

6.2.8 Pits, Ponds and Lagoons

No pits, ponds or lagoons were observed on the subject property.

6.2.9 Stressed Vegetation

No stressed vegetation was observed on the subject property.

6.2.10 Additional Potential Environmental Hazards

No additional environmental hazards, including landfill activities or radiological hazards, were observed.

6.3 Non-ASTM Services

6.3.1 Asbestos-Containing Materials (ACMs)

Due to the absence of structures on the subject property, ACMs were not considered within the scope of this assessment.

6.3.2 Lead-Based Paint (LBP)

Due to the absence of structures on the subject property, LBP was not considered within the scope of this assessment.

6.3.3 Radon

Radon is a colorless, odorless, naturally occurring, radioactive, inert, gaseous element formed by radioactive decay of radium (Ra) atoms. The US EPA has prepared a map to assist National, State, and local organizations to target their resources and to implement radon-resistant building codes. The map divides the country into three Radon Zones, according to the table below:

EPA Radon Zones

EPA Zones	**Average Predicted Radon Levels**	**Potential**
Zone 1	Exceed 4.0 pCi/L	Highest
Zone 2	Between 2.0 and 4.0 pCi/L	Moderate
Zone 3	Less than 2.0 pCi/L	Low

It is important to note that the EPA has found homes with elevated levels of radon in all three zones, and the US EPA recommends site-specific testing in order to determine radon levels at a specific location. However, the map does give a valuable indication of the propensity of radon gas accumulation in structures.

Radon sampling was not conducted as part of this assessment. Review of the US EPA Map of Radon Zones places the subject property in Zone 2. Based upon the radon zone classification, radon is not considered to be a significant environmental concern.

6.3.4 Lead in Drinking Water

According to available information, a public water system operated by the Hayward Department of Utilities and Environmental Services serves the subject property vicinity. According to the departments website, shallow groundwater beneath the subject property is not utilized for domestic purposes. The sources of public water for the City of Hayward are purchased waters from the San Francisco Public Utilities Commission (SEPUC). The SEPUC obtains the majority of this water from the Hetch Hetchy watershed, from snow melt that runs down the Tuolumne River. In addition, a small amount of water is obtained from the Alameda watershed, specifically from surface waters of the Calaveras and the San Antonio Reservoirs and from groundwater from the Sunol Filter Galleries. According to the City of Hayward and the 2016 Annual Water Quality Report, water supplied to the subject property is in compliance with all State and Federal regulations pertaining to drinking water standards, including lead and copper. Water sampling was not conducted to verify water quality.

6.3.5 Mold

Due to the absence of structures on the subject property, mold was not considered within the scope of this assessment.

6.4 Adjacent Property Reconnaissance

The adjacent property reconnaissance consisted of observing the adjacent properties from the subject property premises.

6.4.1 PCBs

One pole-mounted transformer was observed on the adjacent property to the west. No staining or leakage was observed in the vicinity of the transformers. Based on these observations, the presence of adjacent transformers is not expected to represent a significant environmental concern.

No additional items of environmental concern were identified on the adjacent properties during the site assessment, including hazardous substances, petroleum products, ASTs, USTs, evidence of releases, strong or noxious odors, pools of liquids, sumps or clarifiers, pits or lagoons, stressed vegetation, or any other potential environmental hazards.

7.0 FINDINGS AND CONCLUSIONS

Findings

A *recognized environmental condition (REC)* refers to the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: due to release to the environment; under conditions indicative of a release to the environment; or under conditions that pose a material threat of a future release to the environment. The following was identified during the course of this assessment:

- Partner did not identify any RECs during the course of this assessment.

A *controlled recognized environmental condition (CREC)* refers to a REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls. The following was identified during the course of this assessment:

- Partner did not identify any CRECs during the course of this assessment.

A *historical recognized environmental condition (HREC)* refers to a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the property to any required controls. The following was identified during the course of this assessment:

- Partner did not identify any HRECs during the course of this assessment.

An *environmental issue* refers to environmental concerns identified by Partner, which do not qualify as RECs; however, warrant further discussion. The following was identified during the course of this assessment:

- The southeastern portion of the subject property was historically used for agricultural purposes from as early as 1946 until circa-1958. There is a potential that agricultural related chemicals such as pesticides, herbicides, and fertilizers, may have been used and stored onsite. During previous site development activities for the previous residences, near surface soils (where residual agricultural chemical concentrations would have most likely been present, if at all) were generally mixed with fill material or disturbed during grading. Furthermore, it is likely that residual agricultural chemicals (if any) would have likely degraded since the site was last utilized for agricultural purposes (50+ years). These additional variables serve to further reduce the potential for exposure to residual agricultural chemicals (if any). Additionally, Partner did not observe evidence of stressed vegetation throughout the subject property boundaries. Based on these reasons, Partner concludes that the possible former use of agricultural chemicals is not expected to represent a significant environmental concern at this time.

- Based on a review of building records (discussed in Section 4.1.6), the subject property was historically equipped with at least one septic system. Based on the historical residential nature of occupancy, previous on-site septic systems are not expected to represent a significant environmental concern. However, if any septic systems are encountered during future redevelopment activities, Partner recommends the systems be removed and/or abandoned in accordance with applicable regulations.

Conclusions, Opinions and Recommendations

Partner has performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E1527-13 of 29497, 29505, 29547, & 29553 Mission Boulevard in the City of Hayward, Alameda County, California (the "subject property"). Any exceptions to, or deletions from, this practice are described in Section 1.5 of this report.

This assessment has revealed no evidence of RECs in connection with the subject property; however, environmental issues were identified. Based on the conclusions of this assessment, Partner recommends no further investigation of the subject property at this time.

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8.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

Partner has performed a Phase I Environmental Site Assessment of the property located at 29497, 29505, 29547, & 29553 Mission Boulevard in the City of Hayward, Alameda County, California in conformance with the scope and limitations of the protocol and the limitations stated earlier in this report. Exceptions to or deletions from this protocol are discussed earlier in this report.

By signing below, Partner declares that, to the best of our professional knowledge and belief, we meet the definition of *Environmental Professional* as defined in §312.10 of 40 CFR §312. Partner has the specific qualifications based on education, training, and experience to assess a *property* of the nature, history, and setting of the subject *property*. Partner has developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Prepared By:

Bailey Balshor

Bailey Balshor
Environmental Scientist

Reviewed By:

David Boyce
Senior Author

9.0 REFERENCES

Reference Documents

American Society for Testing and Materials, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, ASTM Designation: E1527-13.

Environmental Data Resources (EDR), Radius Report, February 2018

Federal Emergency Management Agency, Federal Insurance Administration, National Flood Insurance Program, Flood Insurance Map, accessed via internet, February 2018

United States Department of Agriculture, Natural Resources Conservation Service, accessed via internet, February 2018

United States Department of Agriculture, Natural Resources Conservation Service, Web Soil Survey, accessed via the internet, February 2018

United States Environmental Protection Agency, EPA Map of Radon Zones (Document EPA-402-R-93-071), accessed via the internet, February 2018

United States Geological Survey, accessed via the internet, February 2018

United States Geological Survey Topographic Map 2012, 7.5 minute series, accessed via internet, February 2018

Attachment V

FIGURES

1 SITE LOCATION MAP

2 SITE PLAN

3 TOPOGRAPHIC MAP

Attachment V

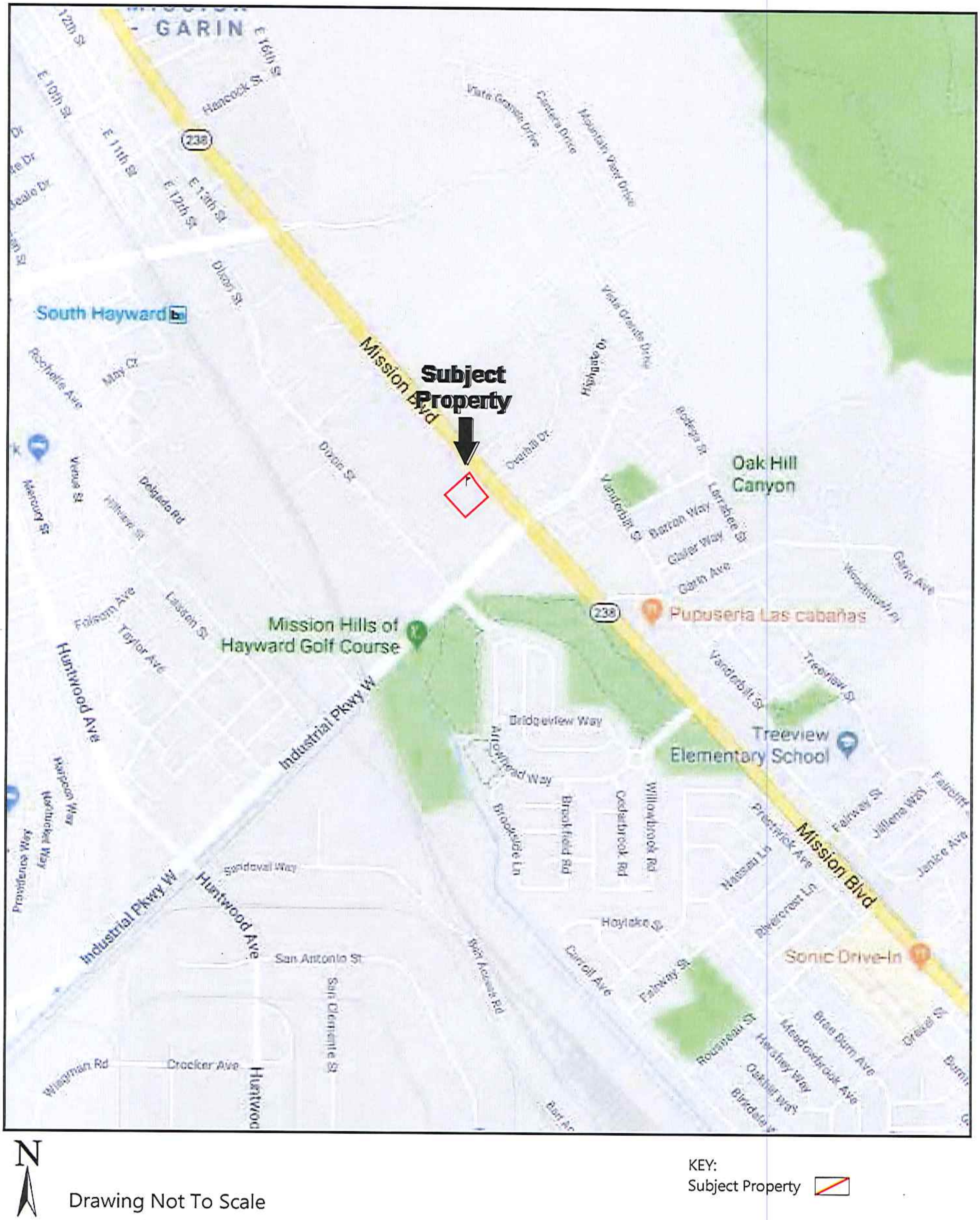

FIGURE 1: SITE LOCATION MAP
Project No. 17-202015.1

PARTNER

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FIGURE 2: SITE PLAN
Project No. 17-202015.1

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N

USGS 7.5 Minute *Hayward, California* Quadrangle
Created: 2012

KEY:
Subject Property ▭

FIGURE 3: TOPOGRAPHIC MAP
Project No. 17-202015.1

PARTNER

APPENDIX A: SITE PHOTOGRAPHS

PARTNER

1. Northeast subject property line from eastern corner

2. Overview of subject property from eastern corner

3. Southeast subject property line from eastern corner

4. Overview of subject property from mid-southeast subject property line

5. Southeast subject property line from southern corner

6. Overview of subject property from southern corner

7. Southwestern subject property line from southern corner

8. Southwestern subject property line from western corner

9. Overview of subject property from western corner

10. Northwestern subject property line from western corner

11. Overview of subject property from mid-northwestern subject property line

12. Northwestern subject property line from northern corner

13. Overview of subject property from northern corner

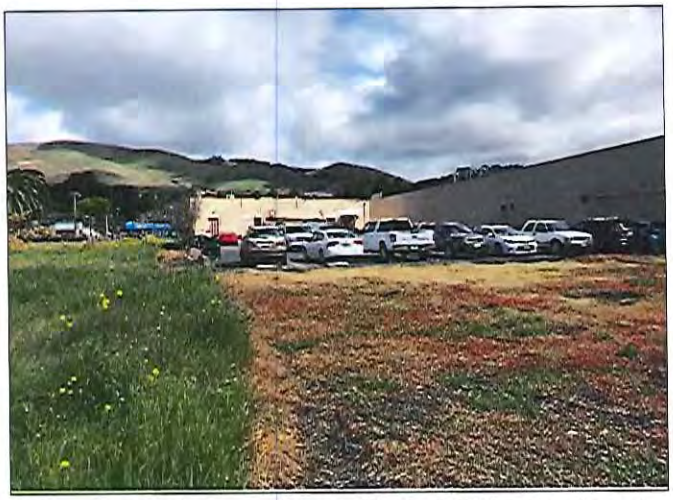
14. Northeastern subject property line from northern corner

15. Overview of property from mid-northeastern subject property line

16. Typical trash found along mostly the southwestern and northwestern subject property lines

17. Typical trash found along mostly the southwestern and northwestern subject property lines

18. Red Chili and Just Potato Salad adjacent to the southeast



19. Parking lot associated with Red Chili and adjacent to the southeast

20. Multi-family residences adjacent to the south and west

21. Laborer's Union of North America adjacent to the northwest

22. Norcal Tire across Mission Boulevard and adjacent to the northeast

23. Nichiren Buddhist International Center and Thrift Center across Mission Boulevard

24. Kash Fabrics across Mission Boulevard, adjacent to the east

Appendix G

Noise Measurement Data

Attachment V

Rincon Consultants, Inc.
Environmental Scientists Planners Engineers
www.rinconconsultants.com

Ambient Noise Survey Data Sheet

Instructions: Document noise measurement locations with a photo of the site, including the noise meter. Additionally, take notes on general and secondary noise sources, including the instantaneous noise level if possible. As a reminder, A/C weighting should be set to "A" and generally response time should be set to "fast." For additional information, please review the *Noise Measurement Protocol* in the pelican case.

Project Name: Hayward Mission Farm Apartments **Job Number:**
Date: 8/14 **Operator Name:** Beth Wilson

Measurement #1

Location: Mission Blvd frontage Begin time: 11:55am Finish time: 12:10pm
Measurement No.: 1 Wind (mph): 6 mph Direction: West
Cloud Cover Class: Overcast (>80%) ☐ Light (20-80%) ☐ Sunny (<20%) ☒
Calibration (dB): Start: 94.0 End: 94.0
Primary Noise Sources: Automobiles along Mission Distance: ~ 30ft to center line
Secondary Noise Sources: Some noise from nearby restaurant
Notes:

Traffic Count: Passenger Cars: use traffic study
Medium to Heavy Duty Trucks (3 axles): | Heavy Duty Trucks (4+ axles):
Instantaneous Noise Sources/Levels (e.g., airplane, bus airbrake, etc.):

Leq:	70.0	SEL:	99.5	Lmax:	85.8	Lmin:	48.4	PK:	109.8
L(05):	76.0	L(10):	74.4	L(50):	65.0	L(90):	54.0	L(95):	51.9

Response: Slow ☐ Fast ☒ Peak ☐ Impulse ☐

Measurement #2

Location: back of property; rear perimeter Begin time: Finish time:
Measurement No.: 2 Wind (mph): 6 Direction: West
Cloud Cover Class: Overcast (>80%) ☐ Light (20-80%) ☐ Sunny (<20%) ☒
Calibration (dB): Start: 94.0 End: 94.0
Primary Noise Sources: Some noise from apartments Distance: N/A
Secondary Noise Sources: Car Idling
Notes:

Traffic Count: Passenger Cars: N/A
Medium to Heavy Duty Trucks (3 axles): Heavy Duty Trucks (4+ axles):
Instantaneous Noise Sources/Levels (e.g., airplane, bus airbrake, etc.): airplane flyover

Leq:	53.0	SEL:	82.5	Lmax:	75.3	Lmin:	45.9	PK:	92.7
L(05):	57.8	L(10):	54.1	L(50):	48.9	L(90):	47.1	L(95):	46.7

Response: Slow ☐ Fast ☒ Peak ☐ Impulse ☐

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Noise Measurement 1

Data Logger 2	
Duration (seconds)	3
Weighting	A
Response	FAST
Range	40-100
L05	76
L10	74.4
L50	65
L90	54
L95	51.9
Lmax	85.8
Time	8/14/2019 11:53
SEL	99.5
Leq	70

Leq (Manual) **70.08655**

No.s	Date Time	dB	Sound Energy
1	8/14/2019 11:51	61.1	3864748.655
2	8/14/2019 11:52	61.1	3864748.655
3	8/14/2019 11:52	58.7	2223930.724
4	8/14/2019 11:52	56.8	1435890.277
5	8/14/2019 11:52	57.1	1538584.152
6	8/14/2019 11:52	67.7	17665309.66
7	8/14/2019 11:52	71.7	44373251.65
8	8/14/2019 11:52	65.3	10165324.68
9	8/14/2019 11:52	75.2	99339336.44
10	8/14/2019 11:52	70.3	32145579.16
11	8/14/2019 11:52	59.1	2438491.548
12	8/14/2019 11:52	59	2382984.704
13	8/14/2019 11:52	59.2	2495291.313
14	8/14/2019 11:52	58.1	1936962.687
15	8/14/2019 11:52	54.4	826268.611
16	8/14/2019 11:52	56.7	1403205.424
17	8/14/2019 11:52	53.4	656328.4872
18	8/14/2019 11:52	53.4	656328.4872
19	8/14/2019 11:52	52.1	486543.0292
20	8/14/2019 11:52	52.9	584953.3799
21	8/14/2019 11:52	54	753565.9295
22	8/14/2019 11:52	55.7	1114605.687
23	8/14/2019 11:52	55.6	1089234.164
24	8/14/2019 11:52	56.6	1371264.569
25	8/14/2019 11:52	61.9	4646449.857
26	8/14/2019 11:52	65.9	11671354.35
27	8/14/2019 11:52	71	37767762.35

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28	8/14/2019 11:52	81.4	414115279.4
29	8/14/2019 11:52	70.7	35246926.65
30	8/14/2019 11:52	65.5	10644401.68
31	8/14/2019 11:52	71.4	41411527.94
32	8/14/2019 11:53	63.8	7196498.757
33	8/14/2019 11:53	71.3	40468886.48
34	8/14/2019 11:53	62.6	5459102.576
35	8/14/2019 11:53	63	5985786.945
36	8/14/2019 11:53	58.8	2275732.725
37	8/14/2019 11:53	61.1	3864748.655
38	8/14/2019 11:53	64.2	7890803.976
39	8/14/2019 11:53	68.9	23287413.5
40	8/14/2019 11:53	79.1	243849154.8
41	8/14/2019 11:53	77	150356170.1
42	8/14/2019 11:53	71	37767762.35
43	8/14/2019 11:53	71.6	43363193.12
44	8/14/2019 11:53	70.4	32894345.88
45	8/14/2019 11:53	73.5	67161634.16
46	8/14/2019 11:53	77.7	176653096.6
47	8/14/2019 11:53	78.1	193696268.7
48	8/14/2019 11:53	78	189287203.3
49	8/14/2019 11:53	73.7	70326864.46
50	8/14/2019 11:53	74.2	78908039.76
51	8/14/2019 11:53	71.9	46464498.57
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53	8/14/2019 11:53	74.3	80746044.12
54	8/14/2019 11:53	70.8	36067933.04
55	8/14/2019 11:53	76.3	127973855.6
56	8/14/2019 11:53	78.8	227573272.5
57	8/14/2019 11:53	77.9	184978500.6
58	8/14/2019 11:53	77.1	153858415.2
59	8/14/2019 11:53	78.4	207549291.3
60	8/14/2019 11:53	67.2	15744223.81
61	8/14/2019 11:53	76	119432151.2
62	8/14/2019 11:54	63.4	6563284.872
63	8/14/2019 11:54	75.2	99339336.44
64	8/14/2019 11:54	72.3	50947309.57
65	8/14/2019 11:54	73.2	62678883.93
66	8/14/2019 11:54	67.4	16486226.22
67	8/14/2019 11:54	68.4	20754929.13
68	8/14/2019 11:54	62.2	4978760.722
69	8/14/2019 11:54	66.6	13712645.69
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73	8/14/2019 11:54	71.4	41411527.94
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76	8/14/2019 11:54	61.3	4046888.648
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87	8/14/2019 11:54	55.1	970780.9708
88	8/14/2019 11:54	56.6	1371264.569
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90	8/14/2019 11:54	71.2	39547702.16
91	8/14/2019 11:54	72.6	54591025.76
92	8/14/2019 11:55	69.8	28649777.58
93	8/14/2019 11:55	60.9	3690806.312
94	8/14/2019 11:55	64.7	8853627.68
95	8/14/2019 11:55	76.8	143589027.7
96	8/14/2019 11:55	74.2	78908039.76
97	8/14/2019 11:55	74.9	92708862.98
98	8/14/2019 11:55	72.3	50947309.57
99	8/14/2019 11:55	76.1	122214083.3
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114	8/14/2019 11:55	62.8	5716382.154
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177	8/14/2019 11:57	77.5	168702397.6
178	8/14/2019 11:57	74.3	80746044.12
179	8/14/2019 11:57	73.5	67161634.16
180	8/14/2019 11:57	72.6	54591025.76
181	8/14/2019 11:57	69.7	27997629.02
182	8/14/2019 11:58	75.2	99339336.44
183	8/14/2019 11:58	71	37767762.35
184	8/14/2019 11:58	73.9	73641267.47
185	8/14/2019 11:58	68.8	22757327.25
186	8/14/2019 11:58	69.9	29317116.63
187	8/14/2019 11:58	73.7	70326864.46
188	8/14/2019 11:58	73.5	67161634.16
189	8/14/2019 11:58	72.2	49787607.22
190	8/14/2019 11:58	75.6	108923416.4
191	8/14/2019 11:58	62.5	5334838.23
192	8/14/2019 11:58	57.7	1766530.966
193	8/14/2019 11:58	56.2	1250608.15
194	8/14/2019 11:58	58.1	1936962.687
195	8/14/2019 11:58	65.1	9707809.708
196	8/14/2019 11:58	75.5	106444016.8
197	8/14/2019 11:58	68.7	22239307.24
198	8/14/2019 11:58	71.8	45406837.45
199	8/14/2019 11:58	69	23829847.04
200	8/14/2019 11:58	73.3	64138862.69
201	8/14/2019 11:58	69	23829847.04
202	8/14/2019 11:58	70	30000000
203	8/14/2019 11:58	70.3	32145579.16
204	8/14/2019 11:58	66.5	13400507.76
205	8/14/2019 11:58	68.5	21238373.53
206	8/14/2019 11:58	70.8	36067933.04
207	8/14/2019 11:58	62.7	5586261.41
208	8/14/2019 11:58	70.8	36067933.04
209	8/14/2019 11:58	63.7	7032686.446
210	8/14/2019 11:58	60.3	3214557.916
211	8/14/2019 11:58	65.6	10892341.64
212	8/14/2019 11:59	73.6	68726029.58
213	8/14/2019 11:59	58.7	2223930.724
214	8/14/2019 11:59	58.7	2223930.724
215	8/14/2019 11:59	57.3	1611095.389

216	8/14/2019 11:59	53.7	703268.6446
217	8/14/2019 11:59	52.4	521340.2486
218	8/14/2019 11:59	49.5	267375.2814
219	8/14/2019 11:59	48.9	232874.135
220	8/14/2019 11:59	49.1	243849.1548
221	8/14/2019 11:59	50.2	314138.5644
222	8/14/2019 11:59	52.3	509473.0957
223	8/14/2019 11:59	56.8	1435890.277
224	8/14/2019 11:59	67.4	16486226.22
225	8/14/2019 11:59	69.5	26737528.14
226	8/14/2019 11:59	58.5	2123837.353
227	8/14/2019 11:59	57.1	1538584.152
228	8/14/2019 11:59	55.2	993393.3644
229	8/14/2019 11:59	58.5	2123837.353
230	8/14/2019 11:59	59.8	2864977.758
231	8/14/2019 11:59	61.7	4437325.165
232	8/14/2019 11:59	60.4	3289434.588
233	8/14/2019 11:59	65	9486832.981
234	8/14/2019 11:59	66.8	14358902.77
235	8/14/2019 11:59	58.7	2223930.724
236	8/14/2019 11:59	57.9	1849785.006
237	8/14/2019 11:59	55.1	970780.9708
238	8/14/2019 11:59	59.6	2736032.518
239	8/14/2019 11:59	62.7	5586261.41
240	8/14/2019 11:59	76.4	130954749.7
241	8/14/2019 11:59	65	9486832.981
242	8/14/2019 12:00	64.5	8455148.794
243	8/14/2019 12:00	75.5	106444016.8
244	8/14/2019 12:00	63.1	6125213.834
245	8/14/2019 12:00	75.3	101653246.8
246	8/14/2019 12:00	66.3	12797385.56
247	8/14/2019 12:00	61.6	4336319.312
248	8/14/2019 12:00	67.6	17263198.12
249	8/14/2019 12:00	70.8	36067933.04
250	8/14/2019 12:00	67.5	16870239.76
251	8/14/2019 12:00	77	150356170.1
252	8/14/2019 12:00	68.7	22239307.24
253	8/14/2019 12:00	72.2	49787607.22
254	8/14/2019 12:00	68.2	19820803.44
255	8/14/2019 12:00	64.6	8652094.509
256	8/14/2019 12:00	72.8	57163821.54
257	8/14/2019 12:00	75.6	108923416.4
258	8/14/2019 12:00	75.8	114056818.9
259	8/14/2019 12:00	76.5	134005077.6
260	8/14/2019 12:00	72.4	52134024.86
261	8/14/2019 12:00	72.9	58495337.99
262	8/14/2019 12:00	73.6	68726029.58

263	8/14/2019 12:00	71.5	42376126.34
264	8/14/2019 12:00	72.4	52134024.86
265	8/14/2019 12:00	67.2	15744223.81
266	8/14/2019 12:00	60	3000000
267	8/14/2019 12:00	62.2	4978760.722
268	8/14/2019 12:00	70.6	34444608.64
269	8/14/2019 12:00	71.1	38647486.55
270	8/14/2019 12:00	75.6	108923416.4
271	8/14/2019 12:00	64.9	9270886.298
272	8/14/2019 12:01	66.3	12797385.56
273	8/14/2019 12:01	65	9486832.981
274	8/14/2019 12:01	73.2	62678883.93
275	8/14/2019 12:01	69.6	27360325.18
276	8/14/2019 12:01	69.7	27997629.02
277	8/14/2019 12:01	74.2	78908039.76
278	8/14/2019 12:01	71.5	42376126.34
279	8/14/2019 12:01	63.4	6563284.872
280	8/14/2019 12:01	63.5	6716163.416
281	8/14/2019 12:01	64.9	9270886.298
282	8/14/2019 12:01	64.4	8262686.11
283	8/14/2019 12:01	68	18928720.33
284	8/14/2019 12:01	69.5	26737528.14
285	8/14/2019 12:01	63.1	6125213.834
286	8/14/2019 12:01	58.7	2223930.724
287	8/14/2019 12:01	54.3	807460.4412
288	8/14/2019 12:01	52.2	497876.0722
289	8/14/2019 12:01	53.4	656328.4872
290	8/14/2019 12:01	51.3	404688.8648
291	8/14/2019 12:01	53.6	687260.2958
292	8/14/2019 12:01	50.8	360679.3304
293	8/14/2019 12:01	51.7	443732.5165
294	8/14/2019 12:01	52.2	497876.0722
295	8/14/2019 12:01	50.7	352469.2665
296	8/14/2019 12:01	52.1	486543.0292
297	8/14/2019 12:01	52.9	584953.3799
298	8/14/2019 12:01	52.1	486543.0292
299	8/14/2019 12:01	55.6	1089234.164
300	8/14/2019 12:01	57.8	1807678.758
301	8/14/2019 12:01	60.2	3141385.644
302	8/14/2019 12:02	58.8	2275732.725
303	8/14/2019 12:02	59.3	2553414.115
304	8/14/2019 12:02	60.8	3606793.304
305	8/14/2019 12:02	61.3	4046888.648
306	8/14/2019 12:02	61.2	3954770.216
307	8/14/2019 12:02	61.7	4437325.165
308	8/14/2019 12:02	63.5	6716163.416
309	8/14/2019 12:02	61.5	4237612.634

310	8/14/2019 12:02	59.3	2553414.115
311	8/14/2019 12:02	63.1	6125213.834
312	8/14/2019 12:02	64.2	7890803.976
313	8/14/2019 12:02	69.8	28649777.58
314	8/14/2019 12:02	69.3	25534141.15
315	8/14/2019 12:02	70.5	33660553.63
316	8/14/2019 12:02	61.9	4646449.857
317	8/14/2019 12:02	61.6	4336319.312
318	8/14/2019 12:02	69.3	25534141.15
319	8/14/2019 12:02	70.4	32894345.88
320	8/14/2019 12:02	74.1	77111873.48
321	8/14/2019 12:02	73	59857869.45
322	8/14/2019 12:02	73	59857869.45
323	8/14/2019 12:02	70.9	36908063.12
324	8/14/2019 12:02	74.9	92708862.98
325	8/14/2019 12:02	74	75356592.95
326	8/14/2019 12:02	69.3	25534141.15
327	8/14/2019 12:02	74.6	86520945.09
328	8/14/2019 12:02	73.9	73641267.47
329	8/14/2019 12:02	73.6	68726029.58
330	8/14/2019 12:02	75.9	116713543.5
331	8/14/2019 12:02	76.9	146933645.8
332	8/14/2019 12:03	73.6	68726029.58
333	8/14/2019 12:03	62.4	5213402.486
334	8/14/2019 12:03	65	9486832.981
335	8/14/2019 12:03	70.4	32894345.88
336	8/14/2019 12:03	58.8	2275732.725
337	8/14/2019 12:03	54.5	845514.8794
338	8/14/2019 12:03	57.1	1538584.152
339	8/14/2019 12:03	57.5	1687023.976
340	8/14/2019 12:03	62.8	5716382.154
341	8/14/2019 12:03	67.7	17665309.66
342	8/14/2019 12:03	68.9	23287413.5
343	8/14/2019 12:03	68.6	21733078.8
344	8/14/2019 12:03	71.1	38647486.55
345	8/14/2019 12:03	70.5	33660553.63
346	8/14/2019 12:03	68.9	23287413.5
347	8/14/2019 12:03	64	7535659.295
348	8/14/2019 12:03	62.3	5094730.957
349	8/14/2019 12:03	58.8	2275732.725
350	8/14/2019 12:03	57.1	1538584.152
351	8/14/2019 12:03	57.1	1538584.152
352	8/14/2019 12:03	57.4	1648622.622
353	8/14/2019 12:03	60	3000000
354	8/14/2019 12:03	71.8	45406837.45
355	8/14/2019 12:03	70.3	32145579.16
356	8/14/2019 12:03	69.6	27360325.18

357	8/14/2019 12:03	64.2	7890803.976
358	8/14/2019 12:03	64.5	8455148.794
359	8/14/2019 12:03	63.5	6716163.416
360	8/14/2019 12:03	70.1	30698789.77
361	8/14/2019 12:03	74.1	77111873.48
362	8/14/2019 12:04	68.9	23287413.5
363	8/14/2019 12:04	56.8	1435890.277
364	8/14/2019 12:04	51.9	464644.9857
365	8/14/2019 12:04	51.4	414115.2794
366	8/14/2019 12:04	53.7	703268.6446
367	8/14/2019 12:04	56.5	1340050.776
368	8/14/2019 12:04	63.1	6125213.834
369	8/14/2019 12:04	63.7	7032686.446
370	8/14/2019 12:04	68.3	20282489.26
371	8/14/2019 12:04	72.3	50947309.57
372	8/14/2019 12:04	67.9	18497850.06
373	8/14/2019 12:04	67	15035617.01
374	8/14/2019 12:04	66.8	14358902.77
375	8/14/2019 12:04	67.1	15385841.52
376	8/14/2019 12:04	63.6	6872602.958
377	8/14/2019 12:04	63.9	7364126.747
378	8/14/2019 12:04	62.4	5213402.486
379	8/14/2019 12:04	59.3	2553414.115
380	8/14/2019 12:04	60	3000000
381	8/14/2019 12:04	60.3	3214557.916
382	8/14/2019 12:04	59.1	2438491.548
383	8/14/2019 12:04	60.4	3289434.588
384	8/14/2019 12:04	66	11943215.12
385	8/14/2019 12:04	71.5	42376126.34
386	8/14/2019 12:04	68.9	23287413.5
387	8/14/2019 12:04	65.7	11146056.87
388	8/14/2019 12:04	57.8	1807678.758
389	8/14/2019 12:04	57.4	1648622.622
390	8/14/2019 12:04	66.2	12506081.5
391	8/14/2019 12:04	74.7	88536276.8
392	8/14/2019 12:05	74.5	84551487.94
393	8/14/2019 12:05	75.7	111460568.7
394	8/14/2019 12:05	75.6	108923416.4
395	8/14/2019 12:05	76.4	130954749.7
396	8/14/2019 12:05	76.2	125060815
397	8/14/2019 12:05	75.1	97078097.08
398	8/14/2019 12:05	68.9	23287413.5
399	8/14/2019 12:05	67.8	18076787.58
400	8/14/2019 12:05	68.5	21238373.53
401	8/14/2019 12:05	75.8	114056818.9
402	8/14/2019 12:05	66	11943215.12
403	8/14/2019 12:05	65.7	11146056.87

404	8/14/2019 12:05	64.2	7890803.976
405	8/14/2019 12:05	71	37767762.35
406	8/14/2019 12:05	70.5	33660553.63
407	8/14/2019 12:05	77.4	164862262.2
408	8/14/2019 12:05	77	150356170.1
409	8/14/2019 12:05	70.3	32145579.16
410	8/14/2019 12:05	67.6	17263198.12
411	8/14/2019 12:05	68.6	21733078.8
412	8/14/2019 12:05	63.2	6267888.393
413	8/14/2019 12:05	65.1	9707809.708
414	8/14/2019 12:05	67.2	15744223.81
415	8/14/2019 12:05	60.9	3690806.312
416	8/14/2019 12:05	62	4754679.577
417	8/14/2019 12:05	64	7535659.295
418	8/14/2019 12:05	63.5	6716163.416
419	8/14/2019 12:05	60.3	3214557.916
420	8/14/2019 12:05	58.2	1982080.344
421	8/14/2019 12:05	57.3	1611095.389
422	8/14/2019 12:06	55.7	1114605.687
423	8/14/2019 12:06	57.6	1726319.812
424	8/14/2019 12:06	56.6	1371264.569
425	8/14/2019 12:06	56.8	1435890.277
426	8/14/2019 12:06	60.8	3606793.304
427	8/14/2019 12:06	68.5	21238373.53
428	8/14/2019 12:06	62.8	5716382.154
429	8/14/2019 12:06	56.7	1403205.424
430	8/14/2019 12:06	53.9	736412.6747
431	8/14/2019 12:06	54.9	927088.6298
432	8/14/2019 12:06	54.4	826268.611
433	8/14/2019 12:06	53.2	626788.8393
434	8/14/2019 12:06	55.2	993393.3644
435	8/14/2019 12:06	56.7	1403205.424
436	8/14/2019 12:06	58.7	2223930.724
437	8/14/2019 12:06	60.6	3444460.864
438	8/14/2019 12:06	65.4	10402105.51
439	8/14/2019 12:06	63.3	6413886.269
440	8/14/2019 12:06	63.1	6125213.834
441	8/14/2019 12:06	63.4	6563284.872
442	8/14/2019 12:06	66.3	12797385.56
443	8/14/2019 12:06	70.6	34444608.64
444	8/14/2019 12:06	64	7535659.295
445	8/14/2019 12:06	63	5985786.945
446	8/14/2019 12:06	61.1	3864748.655
447	8/14/2019 12:06	61.6	4336319.312
448	8/14/2019 12:06	60.7	3524692.665
449	8/14/2019 12:06	64.8	9059855.161
450	8/14/2019 12:06	73.4	65632848.72

Noise Measurement 2

Data Logger 2	
Duration (seconds)	3
Weighting	A
Response	FAST
Range	40-100
L05	57.8
L10	54.1
L50	48.9
L90	47.1
L95	46.7
Lmax	75.3
Time	8/14/2019 12:21
SEL	82.5
Leq	53

Leq (Manual) **53.10753**

No.s	Date Time	dB	Sound Energy
1	8/14/2019 12:14	58.2	1982080.344
2	8/14/2019 12:14	58.1	1936962.687
3	8/14/2019 12:14	56.6	1371264.569
4	8/14/2019 12:14	53.4	656328.4872
5	8/14/2019 12:14	53	598578.6945
6	8/14/2019 12:14	52.1	486543.0292
7	8/14/2019 12:14	50.3	321455.7916
8	8/14/2019 12:14	50.3	321455.7916
9	8/14/2019 12:14	48.8	227573.2725
10	8/14/2019 12:14	50.2	314138.5644
11	8/14/2019 12:14	49.8	286497.7758
12	8/14/2019 12:14	49.5	267375.2814
13	8/14/2019 12:14	50.2	314138.5644
14	8/14/2019 12:15	49.9	293171.1663
15	8/14/2019 12:15	53.3	641388.6269
16	8/14/2019 12:15	52.3	509473.0957
17	8/14/2019 12:15	50.5	336605.5363
18	8/14/2019 12:15	49.2	249529.1313
19	8/14/2019 12:15	51.3	404688.8648
20	8/14/2019 12:15	47.8	180767.8758
21	8/14/2019 12:15	53.7	703268.6446
22	8/14/2019 12:15	53	598578.6945
23	8/14/2019 12:15	52.2	497876.0722
24	8/14/2019 12:15	51.9	464644.9857
25	8/14/2019 12:15	48.8	227573.2725
26	8/14/2019 12:15	48	189287.2033
27	8/14/2019 12:15	47.8	180767.8758

28	8/14/2019 12:15	46.9	146933.6458
29	8/14/2019 12:15	46.7	140320.5424
30	8/14/2019 12:15	47	150356.1701
31	8/14/2019 12:15	46.3	127973.8556
32	8/14/2019 12:15	47.2	157442.2381
33	8/14/2019 12:15	47.5	168702.3976
34	8/14/2019 12:15	47.4	164862.2622
35	8/14/2019 12:15	47.3	161109.5389
36	8/14/2019 12:15	54	753565.9295
37	8/14/2019 12:15	47.4	164862.2622
38	8/14/2019 12:15	46.5	134005.0776
39	8/14/2019 12:15	47	150356.1701
40	8/14/2019 12:15	48.8	227573.2725
41	8/14/2019 12:15	48.3	202824.8926
42	8/14/2019 12:15	47.9	184978.5006
43	8/14/2019 12:15	47.5	168702.3976
44	8/14/2019 12:16	52.3	509473.0957
45	8/14/2019 12:16	47.4	164862.2622
46	8/14/2019 12:16	47.6	172631.9812
47	8/14/2019 12:16	48.1	193696.2687
48	8/14/2019 12:16	48.1	193696.2687
49	8/14/2019 12:16	46.7	140320.5424
50	8/14/2019 12:16	46.6	137126.4569
51	8/14/2019 12:16	46.8	143589.0277
52	8/14/2019 12:16	47	150356.1701
53	8/14/2019 12:16	46.6	137126.4569
54	8/14/2019 12:16	46.9	146933.6458
55	8/14/2019 12:16	46.7	140320.5424
56	8/14/2019 12:16	46.3	127973.8556
57	8/14/2019 12:16	46.1	122214.0833
58	8/14/2019 12:16	46.7	140320.5424
59	8/14/2019 12:16	47.7	176653.0966
60	8/14/2019 12:16	47.8	180767.8758
61	8/14/2019 12:16	47.5	168702.3976
62	8/14/2019 12:16	46.4	130954.7497
63	8/14/2019 12:16	46.7	140320.5424
64	8/14/2019 12:16	47.1	153858.4152
65	8/14/2019 12:16	47.2	157442.2381
66	8/14/2019 12:16	48.3	202824.8926
67	8/14/2019 12:16	48.9	232874.135
68	8/14/2019 12:16	49.1	243849.1548
69	8/14/2019 12:16	48.8	227573.2725
70	8/14/2019 12:16	49.2	249529.1313
71	8/14/2019 12:16	49.1	243849.1548
72	8/14/2019 12:16	49.3	255341.4115
73	8/14/2019 12:16	50.6	344446.0864
74	8/14/2019 12:17	52.7	558626.141

75	8/14/2019 12:17	52.3	509473.0957
76	8/14/2019 12:17	56	1194321.512
77	8/14/2019 12:17	57.8	1807678.758
78	8/14/2019 12:17	54.3	807460.4412
79	8/14/2019 12:17	58.8	2275732.725
80	8/14/2019 12:17	65.8	11405681.89
81	8/14/2019 12:17	60.1	3069878.977
82	8/14/2019 12:17	64.7	8853627.68
83	8/14/2019 12:17	65.3	10165324.68
84	8/14/2019 12:17	64.2	7890803.976
85	8/14/2019 12:17	60.7	3524692.665
86	8/14/2019 12:17	59.4	2612890.77
87	8/14/2019 12:17	57.1	1538584.152
88	8/14/2019 12:17	56.9	1469336.458
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95	8/14/2019 12:17	50.3	321455.7916
96	8/14/2019 12:17	48.9	232874.135
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98	8/14/2019 12:17	48.8	227573.2725
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108	8/14/2019 12:18	48.4	207549.2913
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112	8/14/2019 12:18	48	189287.2033
113	8/14/2019 12:18	48	189287.2033
114	8/14/2019 12:18	49.9	293171.1663
115	8/14/2019 12:18	49.2	249529.1313
116	8/14/2019 12:18	49.2	249529.1313
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130	8/14/2019 12:18	48.5	212383.7353
131	8/14/2019 12:18	48.6	217330.788
132	8/14/2019 12:18	46.8	143589.0277
133	8/14/2019 12:18	47.4	164862.2622
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204	8/14/2019 12:21	49.8	286497.7758
205	8/14/2019 12:21	48.6	217330.788
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207	8/14/2019 12:21	47.9	184978.5006
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Appendix H

Transportation Impact Analysis

Transportation Impact Analysis - Final Report

Meta Housing Mixed-Use Development Transportation Impact Study

Hayward, California

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Project Planner: Kevin Yost

Project No. 23697

September 2019

EXECUTIVE SUMMARY

This report presents the findings, conclusions and transportation impact analysis conducted by Kittelson & Associates for the Meta Housing Mixed-Use Development Traffic Study. The project site is located in Hayward, California at 29497-29553 Mission Boulevard.

The project is located on the west side of Mission Boulevard approximately 470 feet north of Industrial Parkway and adjacent to a parcel currently with retail land-use primarily consisting of restaurants.
The Meta Housing Mixed-Use Development would consist of:

- 140 residential units of mid-rise residential
- 1,800 square feet of a coffee shop.
- 2,715 square feet of daycare

Approximately 101 total vehicle parking spaces are provided, including spaces dedicated to accessible, and electric vehicles, and up to 73 long-term bike parking spaces plus 16 short-term bicycle spaces in racks along Mission Boulevard and in the courtyard.

SUMMARY OF FINDINGS

The project is projected to generate 797 daily vehicle trips, 131 vehicle trips in the AM peak hour, and 100 vehicle trips in the PM peak hour. According to the City of Hayward guidelines for preparing traffic studies, the traffic generated by the proposed project results in no impacts at the seven study intersections under the Existing Plus Project conditions, and one impact under 2035 Cumulative Plus Project conditions that was identified in the Hayward 2040 General Plan as an existing deficiency under cumulative conditions. Several intersections in the Cumulative No-Project scenario operate at an unacceptable level (LOS F) in both the AM and PM peak hour. However, the delay from project trips on the AM and PM cumulative scenarios on six of the seven study intersections is less than five seconds with no significant impact to delay. The additional delay to the Industrial Parkway and Mission Boulevard Intersection in the Cumulative Plus Project scenario under AM peak hour conditions is more than five seconds. This deficiency can be addressed by optimizing the intersection's signal timing as a standard condition of approval.

95th percentile queues of the seven study intersections are generally do not exceed queue storage capacity (length of turn lanes) in Existing conditions, with an exception being the EBL movement of Industrial Parkway and Mission Boulevard. After project trips are added in the Existing Plus Project scenario, the SBL movement of Industrial Parkway and Dixon Street in the AM and PM Peak Hour, and the WBR movement in only the AM peak hour, exceeds capacity. In addition, the NBL movement of Mission Boulevard and Valle Vista Avenue also exceed capacity after project trips are added. In cumulative conditions, most study intersections have at least one movement with queue length exceeding storage capacity. The SBL movement of Mission Boulevard and Industrial Parkway exceeds capacity only after the addition of project trips.

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1 EXISTING CONDITIONS

1.1 SETTING

This report presents the findings, conclusions and transportation impact analysis conducted by Kittelson & Associates for the Mission Boulevard Meta Housing Traffic Study located in Hayward, California. The project site is located within 0.7 miles of the South Hayward Bay Area Rapid Transit (BART) Station. The project is located on 29497-29553 Mission Boulevard, north of Industrial Parkway with access on the west side of Mission Boulevard as right-in and right out only. The project area is currently a vacant lot and was designated for development as part of the South Hayward BART/Mission Boulevard Form-Based Code.

1.1.1 Significance Criteria

Goal 4 Local Circulation-M-4.3 of the City of Hayward's 2040 General Plan requires intersections to maintain a peak-hour level of service (LOS) of E or better for signalized intersections. M-4.3 describes this as follows: The City shall maintain a minimum Level of Service E at signalized intersections during the peak commute periods except when a LOS F may be acceptable due to costs of mitigation or when there would be other unacceptable impacts, such as right-of-way acquisition or degradation of the pedestrian environment due to increased crossing distances or unacceptable crossing delays.

Note: City of Hayward has not yet adopted VMT impact criteria per S.B. 743 legislation which has set a 2020 date for adoption. Therefore, this analysis uses level of service according to the jurisdiction's criteria.

The following thresholds of significance were developed based on the CEQA guidelines for establishing thresholds of significance and the applicable standards and policies of the City of Hayward.

- Study Intersections

Site Vicinity Map
Hayward California

Figure
1

H:\23\23967 - Hayward Meta Housing TIA\report\figs\23967 Figure 001.dwg Jul 11, 2019 - 12:45pm - bcullimore Layout Tab: Site Vicinity Map

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1.1.1.1 Signalized Intersections

City of Hayward Intersections

City of Hayward Guidelines state that the proposed project would have a significant impact on traffic and circulation of signalized intersections if AM or PM Peak Hour LOS in the No Project Scenario condition would degrade from an acceptable LOS E or better to an unacceptable LOS F under the Plus Project scenario. The exception to this criterion is when LOS F is determined by the City of Hayward as acceptable due to right-of-way constraints or when there would be unacceptable impacts to other modes of travel, such as bicycle, pedestrian or transit.

In addition, the proposed project would have a significant impact on traffic and circulation of an intersection already operating at LOS F under an Existing or No Project scenario if the addition of project traffic results in an increase of 5.0 seconds or more in the intersection’s average control delay.

1.1.1.2 Unsignalized Intersections

At unsignalized intersections, the proposed project’s impact is based on LOS and delay.

1.1.2 Level of Service Definitions

In this report, LOS is based on the Highway Capacity Manual (HCM) 2000 edition definitions, included in the Synchro 10 software package.

Table 1 (for signalized intersections) and Table 2 (for unsignalized intersections) are provided for ease of reference. The HCM methodology assigns a level of service (LOS) grade to an intersection based on the average control delay for vehicles at the intersection, ranging from LOS A to LOS F; LOS A signifies very slight delay with no approach phase fully utilized while LOS F signifies very high delays and congestion, frequent cycle failures, and long queues.

Table 1: Level of Service Criteria – Signalized Intersections

Level of Service (LOS)	Average Delay (seconds/ vehicle)	Description
A	< 10	LOS A represents free-flow travel with an excellent level of comfort and convenience and the freedom to maneuver.
B	> 10 and < 20	LOS B has stable operating conditions, but the presence of other road users causes a noticeable, though slight, reduction in comfort, convenience, and maneuvering freedom.
C	> 20 and < 35	LOS C has stable operating conditions, but the operation of individual users is substantially affected by the interaction with others in the traffic stream.

Level of Service (LOS)	Average Delay (seconds/ vehicle)	Description
D	> 35 and < 55	LOS D represents high-density, but stable flow. Users experience severe restriction in speed and freedom to maneuver, with poor levels of comfort and convenience.
E	> 55 and < 80	LOS E represents operating conditions at or near capacity. Speeds are reduced to a low but relatively uniform value. Freedom to maneuver is difficult with users experiencing frustration and poor comfort and convenience. Unstable operation is frequent, and minor disturbances in traffic flow can cause breakdown conditions.
F	> 80	LOS F is used to define forced or breakdown conditions. This condition exists wherever the volume of traffic exceeds the capacity of the roadway. Long queues can form behind these bottleneck points with queued traffic traveling in a stop-and-go fashion.

Source: Transportation Research Board, Highway Capacity Manual, Washington, D.C., 2016.

Table 2: Level of Service Criteria – Unsignalized Intersections

Level of Service (LOS	Average Delay (seconds / vehicle)	Description
A	< 10	Little or no delay
B	> 10 and < 15	Short traffic delay
C	> 15 and < 25	Average traffic delays
D	> 25 and < 35	Long traffic delays
E	> 35 and < 50	Very long traffic delays
F	> 50	Extreme delays potentially affecting other traffic movements in the intersection

Source: Transportation Research Board, Highway Capacity Manual, Washington, D.C., 2016.

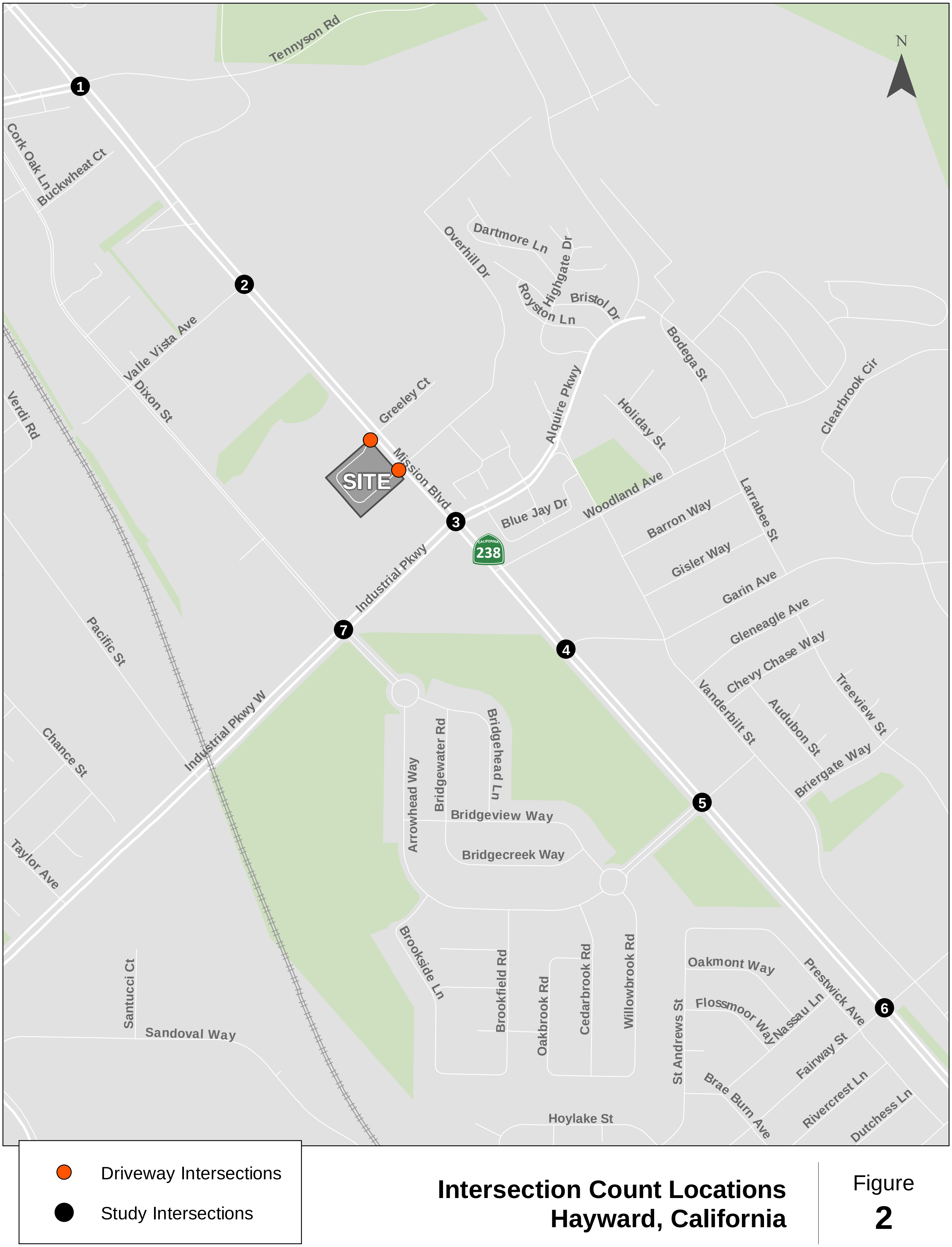
1.1.3 Study Intersections

A total of 7 study intersections (listed in Table 3 and shown in Figure 2) were selected for the purposes of this analysis. These study intersections were selected based on discussions with City of Hayward staff.

Table 3: Study Intersections

#	Street Name		Control
	North-South	East-West	
1	Mission Boulevard	Tennyson Road	Signal
2	Mission Boulevard	Valle Vista Avenue	Signal
3	Mission Boulevard	Industrial Parkway	Signal
4	Mission Boulevard	Garin Avenue	Signal
5	Mission Boulevard	Arrowhead Way	Signal
6	Mission Boulevard	Fairway Street	Signal
7	Dixon Street	Industrial Parkway	Signal

Source: Kittelson & Associates, Inc. 2019



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Intersection Count Locations
Hayward, California

Figure
2

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Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet

1.2 NETWORK

1.2.1 Roadways

The roadway system in the study area consists of arterial roadways that serve local and regional traffic demand.

Mission Boulevard is classified as principal arterial and a truck route by the City of Hayward and also known as State Route 185 (SR 185) north of Foothill Boulevard and formerly as SR 238 south of Foothill Boulevard; it provides connectivity to destinations such as San Leandro, downtown Hayward, and California State University, East Bay. Mission Boulevard has two to three lanes in each direction.

Tennyson Boulevard is classified as a principle arterial and continues west to the South Hayward BART Station and Intertstate-880. Tennyson Boulevard has two lanes in each direction and a center median.

Industrial Boulevard is a primarily four-lane roadway classified as a Minor Arterial. Industrial Boulevard also connects to Interstate-880 and contains mostly industrial uses south of the project site. Industrial Boulevard has two lanes in each direction.

Valle Vista Avenue is a two-lane roadway classified as a Major Collector. Valle Vista Avenue may serve as a route for project traffic to access the South Hayward BART station. Valle Vista Avenue contains Class II bike lanes and on-street parking in each direction.

Dixon Street is classified as a Major Collector. Dixon Street connects to Arrowhead Way to the South and the South Hayward BART Station to the north. Dixon street has Class II bike lanes in each direction.

1.2.1 On-street Parking

The arterials surrounding the project site have limited on-street parking. Parking in the vicinity of the project site is located primarily off-street in residential and retail developments. Mission Boulevard lacks on-street parking in the southbound direction at the project site location and north of the project site. There is some on-street parking on Mission Boulevard in the northbound direction across the road from the project site. Tennyson Road contains parking west of Mission Boulevard. Valle Vista Avenue and Dixon Street both contain on-street parking.

1.2.2 Transit Service

The transit system in the study area consists of local bus and regional rail service. The transit facilities in the study area are discussed below.

Bay Area Rapid Transit

The South Hayward Bay Area Rapid Transit (BART) station is located approximately ¾ mile north of the project site. The Station is part of the Fremont-Richmond and Fremont-Daly City lines. Each line currently operates at 15-minute headways during peak periods, resulting in an average peak period frequency of 7.5 minutes at the Station. The South Hayward BART Station is less than a mile walking or biking from the project site.

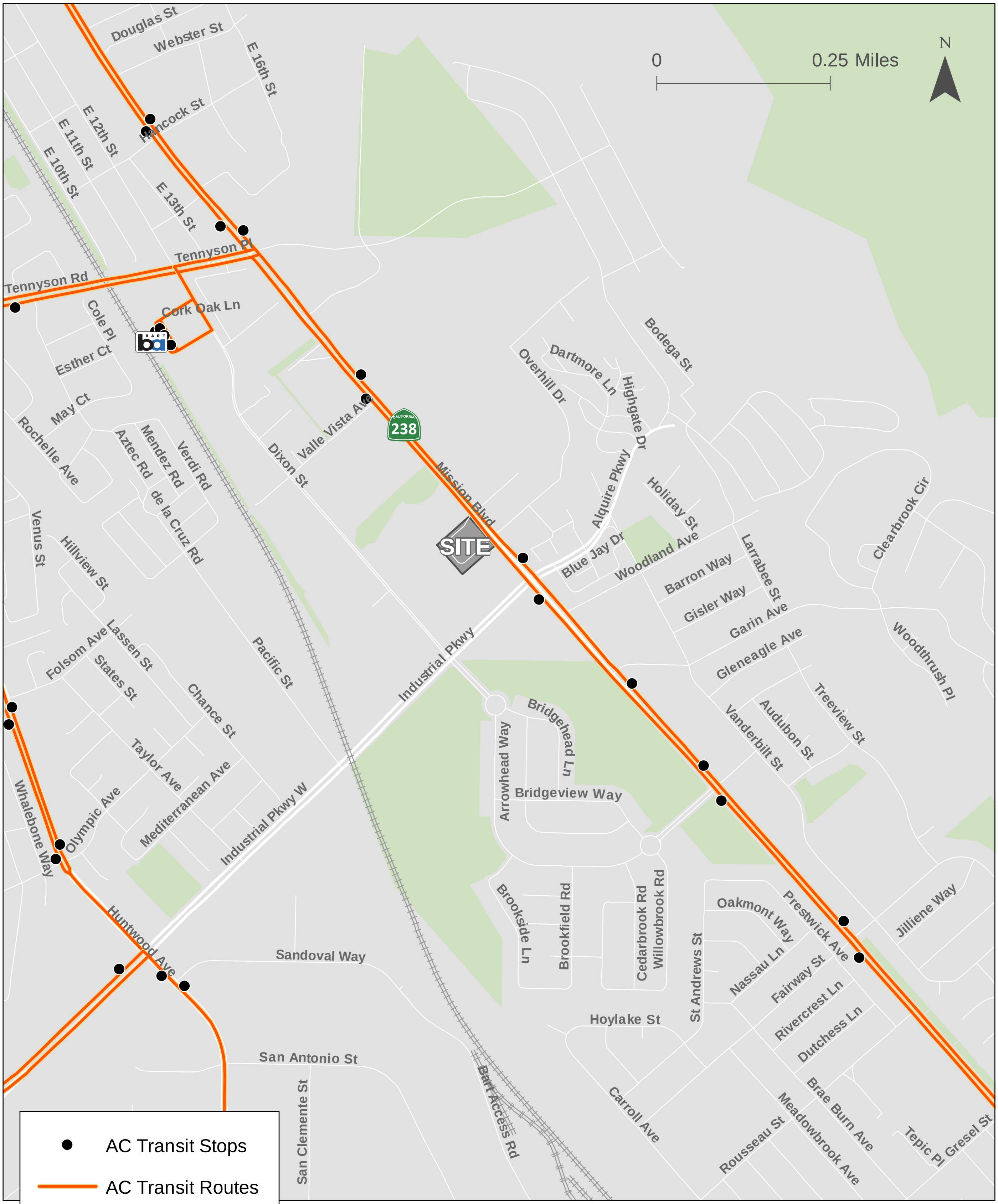
Alameda-Contra Costa Transit District

Alameda-Contra Costa Transit District (AC Transit) provides bus service in the study area. AC Transit bus routes and local bus stops are shown on Figure 3. Routes 99 and 801 service the project site location along Mission Blvd. Routes 99 and 801 have stops just south of the project site at Mission Blvd and Alquire Pkwy and north of the project site at Mission Blvd and Valle Vista Ave.

The South Hayward BART Station acts as a local transit center for AC Transit. Routes 22, 37, 68, 83, 85, 86, 99, and 801 all stop at the South Hayward BART Station, generally with 15-30-minute headways during the AM and PM peak hours.

Transit stops in the study area outside of the South Hayward BART Station generally have posted signs but do not include amenities such as a shelter, seating, and landscaping.

Attachment V



Existing Transit Network
Hayward, California

Figure
3

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet

1.2.3 Pedestrian Facilities

The study area offers several types of facilities and amenities that support walking. The availability and quality of pedestrian facilities can be analyzed using seven key factors as shown in Table 4.

Table 4: Pedestrian Facility Conditions

Factor	Description	Assessment
Sidewalk Availability	Sidewalk availability is core to supporting walkability and safety separating pedestrians from vehicles and other modes. In addition, it is important that sidewalks are present on both sides of the roadway and are available along the entire segment rather than end midblock.	Sidewalks are located on both sides of arterials in the area (Mission Blvd, Industrial Blvd, and Tennyson Rd). Other minor streets all have sidewalks, but Valle Vista Ave. contains no sidewalk on the southern side of the street.
Sidewalk Conditions	Cracked, broken, or otherwise damaged sidewalks can pose a safety hazard and discourage walking.	Sidewalk conditions along Mission Blvd are in mostly good condition, with some cracks. On minor streets such as Alquire Parkway, sidewalks conditions are adequate, with some infrastructure placed in the sidewalk creating barriers for navigating.
Crosswalk Availability	Marked crosswalks can safely accommodate pedestrians that need to cross streets. A lack of marked crosswalks could hinder walkability since pedestrians need to travel greater distances to reach a safe marked crossing point. Drivers may also be less likely to yield to intersections at unmarked crossings.	Crosswalks are located at all signalized intersections along Mission Blvd. However, there are few crosswalks placed in between signalized intersections. The nearest crosswalk to the project site is located 450 feet south. The next nearest crosswalk is located 3,000 feet north on Valle Vista.
Shading	Shading, whether natural or artificial, can encourage walking in areas such as California and specifically Hayward which are relatively warm with limited rainfall, especially in the summer.	Street trees are placed intermittently on the east and west of Mission Blvd. On minor streets, such as Valle Vista, and Alquire Blvd, street trees are more common.
Flat Grade	Steep hills and ravines can discourage walking, especially for pedestrians with limited mobility.	The immediate project vicinity is flat. Further east away from the core of Hayward, the terrain becomes hilly.
Buffer	Buffers which provide separation between pedestrians and moving vehicles can help improve the walking experience, and can include landscaping, parked vehicles, and bulbouts, which serve to both reduce pedestrian crossing distances at intersections and as a traffic calming measure.	Minor roads, including Arrowhead Way and Alquire Blvd, have landscaped buffers between sidewalk and traffic. However, major arterials such as Tennyson Rd and Industrial Blvd do not.
Amenities	In addition to physical facilities that accommodate walking, useful or interesting amenities along sidewalks create a more interesting walking	Pedestrian oriented lighting is located north of the project site on Mission Blvd. The adjacent northwest corner of Mission Blvd and Industrial Blvd has

Factor	Description	Assessment
	environment and increase pedestrian comfort. Amenities can include sidewalk-adjacent retail and restaurants, landscaping, and street furniture.	shops and restaurants. Landscaping and street furniture are all limited throughout the project site vicinity. There is a golf course (Mission Hills Golf Course) on the west side of Mission Blvd south of Arrowhead Way. A new park being constructed north of the project site as a part of the SoHay development would be accessible by residents.

Source: Kittelson & Associates, Inc. 2019

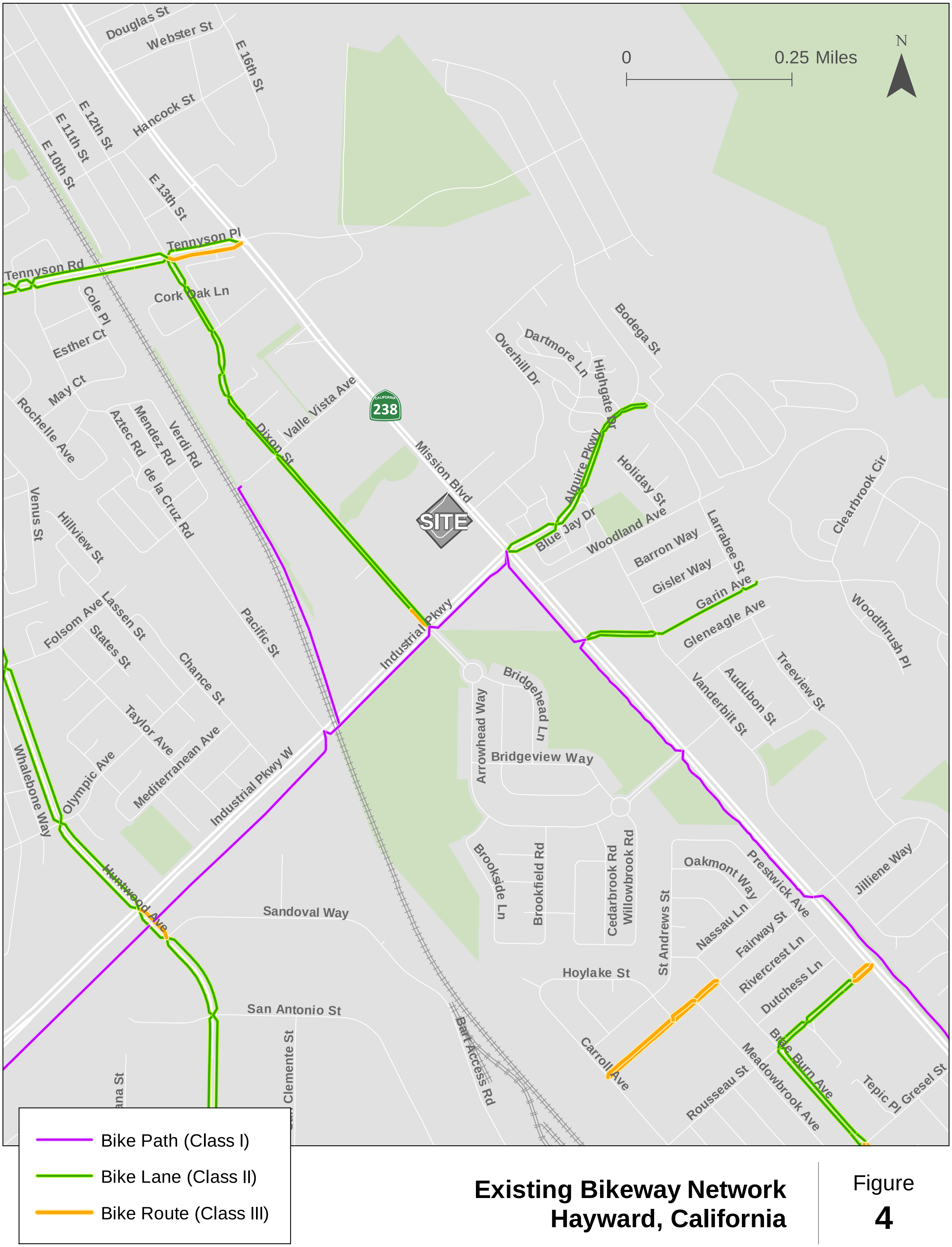
1.2.4 Bicycle Facilities

Bicycle facilities are categorized into four types, as described below

- Class I Bikeway (Bike Path). Also known as a shared path or multi-use path, a bike path is a paved right-of-way for bicycle travel that is completely separate from any street or highway.
- Class II Bikeway (Bike Lane). A striped and stenciled lane for one-way bicycle travel on a street or highway. This facility could include a buffered space between the bike lane and vehicle lane and the bike lane could be adjacent to on-street parking.
- Class III Bikeway (Bike Route). A signed route along a street where the bicyclist shares the right-of-way with motor vehicles. This facility can also be designated using a shared-lane marking (sharrow).
- Class IV Bikeway (Separated Bike Lane). A bikeway for the exclusive use of bicycles including a separation required between the separated bikeway and the through vehicular traffic. The separation may include, but is not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

Figure 4 shows the existing bikeway network in the project site vicinity. Bicycle facilities in the study area are primarily Class I designated bike paths and Class II bike lanes. To the south of the project site, a Class I off-street bike path is located on the south side of Industrial Boulevard and the west side of Mission Boulevard. This bike trail follows south on Mission Boulevard and provides a connection towards Union City. There are no designated on-street bikeways on major arterials in the project vicinity, including on Industrial Boulevard, Mission Boulevard, and Tennyson Road. Additional existing marked bicycle facilities near the project site include:

- A Class II bikeway on Dixon St between Tennyson Road and Industrial Parkway.
- A Class II bikeway on Tennyson Road west of Industrial. This bikeway is also buffered intermittently.
- A Class II on Garin Avenue west of Mission.



Existing Bikeway Network
Hayward, California

Figure
4

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Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet

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1.3 EXISTING TRAFFIC VOLUMES

1.3.1 Automobile Traffic Volumes

Automobile turning movement counts at the 7 study intersections were collected in the field on Wednesday, April 10th, 2019 during the weekday morning (7:00 AM to 9:00 AM) and evening (4:00 PM to 6:00 PM) peak periods. The highest peak hour was computed from each peak period for the most conservative analysis.

Figure 5 shows the existing automobile peak hour volumes, intersection control (i.e., signalized or stop-controlled) and lane geometries at the study intersections.

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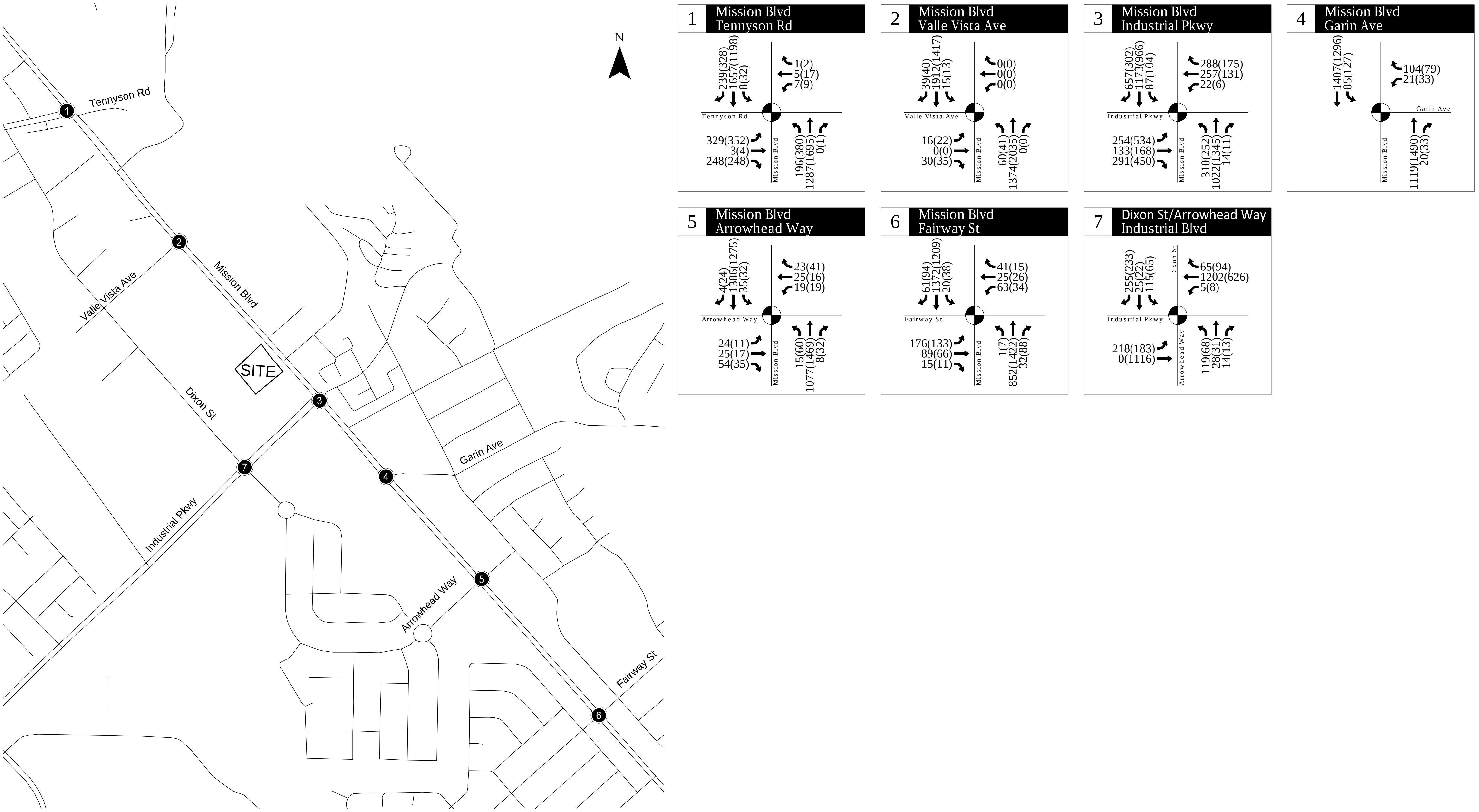


AM(PM) - Traffic Volume

◐ - Traffic Signal

Existing Traffic Volumes
AM & PM Peak Hours
Hayward California

Figure
5

1.3.2 Pedestrian and Bicycle Volumes

Pedestrian and bicycle volumes were collected at the study intersections as part of the data collection effort. Table 5 and Table 6 present the pedestrian and bicycle volume data for the AM and PM peak hours, respectively. Pedestrian and bicycle volumes were collected for informational purposes and were not used for impact assessment.

Table 5: Pedestrian and Bicycle Volumes, Existing Conditions, AM Peak Hour

#	Street Name		Pedestrian Crossings				Northbound Bicycles			Southbound Bicycles			Eastbound Bicycles			Westbound Bicycles		
	North-South	East-West	N	S	E	W	L	T	R	L	T	R	L	T	R	L	T	R
1	Mission Boulevard	Tennyson Road	6	4	5	8	0	1	0	0	3	0	0	0	0	0	0	0
2	Mission Boulevard	Valle Vista Avenue	3	0	5	5	0	4	0	0	1	0	0	0	0	0	0	0
3	Mission Boulevard	Industrial Parkway	0	5	4	4	1	3	0	0	0	0	0	0	0	0	0	0
4	Mission Boulevard	Garin Avenue	0	5	2	3	0	1	0	1	3	0	2	0	0	0	0	0
5	Mission Boulevard	Arrowhead Way	8	0	4	2	1	3	0	0	2	0	0	0	0	0	1	0
6	Mission Boulevard	Fairway Street	2	33	2	1	0	1	0	0	2	0	2	0	0	0	0	0
7	Mission Boulevard	Industrial Parkway	0	6	6	15	0	0	0	0	1	0	1	0	0	0	3	1

Data Source: Quality Counts manual turning movement counts (May 2019).

Table 6: Pedestrian and Bicycle Volumes, Existing Conditions, PM Peak Hour

#	Street Name		Pedestrian Crossings				Northbound Bicycles			Southbound Bicycles			Eastbound Bicycles			Westbound Bicycles		
	North-South	East-West	N	S	E	W	L	T	R	L	T	R	L	T	R	L	T	R
1	Mission Boulevard	Tennyson Road	8	3	7	6	0	4	0	0	1	0	1	0	1	0	0	0
2	Mission Boulevard	Valle Vista Avenue	6	0	8	1	0	5	0	0	3	0	0	0	0	0	0	0
3	Mission Boulevard	Industrial Parkway	9	4	6	18	0	0	0	2	1	3	4	1	0	0	0	0
4	Mission Boulevard	Garin Avenue	0	10	7	3	1	5	0	0	1	0	0	0	0	0	0	2
5	Mission Boulevard	Arrowhead Way	0	5	9	0	0	3	0	1	1	0	0	0	0	0	0	0
6	Mission Boulevard	Fairway Street	5	0	5	1	0	3	0	0	1	0	0	0	1	0	0	0
7	Mission Boulevard	Industrial Parkway	0	2	3	1	0	0	1	0	1	2	1	0	0	0	0	0

Data Source: Quality Counts manual turning movement counts (May 2019).

1.4 PERFORMANCE

1.4.1 Automobile Level of Service

Levels of service (LOS) at the study intersections were evaluated based on the Highway Capacity Manual (HCM) 2000 methodology, as implemented in the Synchro 10 software package. LOS analysis was performed for the AM and PM peak hours, using traffic counts collected in the field. Table 7 provides a summary of the existing automobile LOS for all study intersections. Appendix C contains the Existing Conditions LOS worksheets at the study intersections.

As shown in Table 7, the seven study intersections operate at LOS C or better during the AM and PM peak hours. All intersections operate above the LOS E standard for the City of Hayward.

Table 7: Automobile Level of Service, Existing Conditions

#	Intersection	Control	Peak Hour	Existing	
				Delay (s/veh)	LOS
1	Mission Boulevard & Tennyson Road	Signal	AM	21.8	C
			PM	30.8	C
2	Mission Boulevard & Valle Vista Avenue	Signal	AM	12.0	B
			PM	10.8	B
3	Mission Boulevard & Industrial Parkway	Signal	AM	31.1	C
			PM	30.2	C
4	Mission Boulevard & Garin Avenue	Signal	AM	6.7	A
			PM	8.9	A
5	Mission Boulevard & Arrowhead Way	Signal	AM	7.4	A
			PM	8.9	A
6	Mission Boulevard & Fairway Street	Signal	AM	15.1	B
			PM	18.7	B
7	Dixon Street & Industrial Parkway	Signal	AM	21.6	C
			PM	14	B

Source: Kittelson & Associates, Inc. 2019

2 PROJECT DESCRIPTION

The Meta Housing Mixed-Use Development proposes residential, retail, and daycare uses and is a maximum of 5 stories tall. Figure 6 shows the project site plan. The project would consist of:

- 140 residential units of a mid-rise residential
- 1,800 square feet of a coffee shop
- 2,715 square feet of daycare

The residential portion of the project will be designed as family housing. The bedroom-mix breakdown for the residential portion is:

- 43 1-BR Units
- 55 2-BR Units
- 42 3-BR Units

The site will feature an interior courtyard and a resident accessible outdoor space for the community. The retail use will have public-facing frontage including outdoor seating. The daycare use will also have public-facing frontage and be accessible from both the residential side by residents or the public via the driveways. Approximately 101 total off-street vehicle parking spaces are provided. There is dedicated parking for the retail, residential, and daycare uses. Additionally, the project includes 6 temporary bike parking spaces and an indoor secure bike room with 73 long-term bike parking spaces. In addition, 16 short term bicycle spaces have been provided in racks along Mission Boulevard and in the courtyard for a total of 89 combined bicycle parking spaces.

2.1.1 Site Circulation

Access to the project site is located only on Mission Boulevard. The north and south driveways both provide a right-in entrance and a right-out exit onto the right lane on Mission Boulevard in the approach to Industrial Parkway. The Daycare parking and drop-off area is located closest to the northern driveway, where there are eight parking stalls dedicated to daycare and it assumed that daycare trips will use this driveway. Drop-off and pick-up at the Daycare will occur at this dedicated off-street location.

The service entrance for retail uses is located on the southern driveway. It is assumed that service vehicles would enter through this entrance. Waste vehicles for the retail or residential site would be able to park in front of retail waste storage area and then circulate around to the residential waste storage area. Waste vehicles would need to temporarily block one lane of traffic on the internal circulation road while picking up the waste. This is not expected to create any impacts to internal circulation or to City streets. The entrance for the residential area is accessible via both driveways that circulate to the residential parking at the back.

Emergency vehicles would enter at either project driveway and then circulate around the site to exit. The site plan indicates a minimum of 26 feet of clearance which is code minimum for fire truck access based on the building height. Trip distribution has assumed that 60% of trips inbound and outbound to the site will use the southern driveway due to the presence of retail land uses and parking located directly adjacent to the south driveway. 40% of trips are anticipated to use the northern driveway to access the daycare center and residential area.

2.1.2 Off-Street Parking

The project site is within the location of the South Hayward BART/Mission Boulevard Form-Based Code boundaries. According to the Code, the project site is land-use code T-5 Urban Center Zone. Parking regulations for the T-5 zone are as follows:

“For each Residential rental, a maximum of 1.5 off-street parking spaces may be provided.”

The Code states there are no parking minimums or maximums for non-residential uses for land-use code T-5. At 140 units, this is a maximum of 210 total spaces, which is well over the 101 provided parking spaces, of which four are for motorcycles. There are no parking minimum requirements for residential use for the T-5 land-use code.

The South Hayward BART Form-Based Code also provides bike parking requirements. For long-term bike parking, the code requires 0.2 long-term and 0.1 short term bike parking spaces per bedroom. The code also requires 0.1 long-term and short-term spaces per 100 square feet of retail, and 0.1 spaces per child for daycare. The elementary school bike parking rate (per student) was used in lieu of daycare bike parking rates.

The project provides a combined total of 89 short term and long term bike parking spaces, which is in compliance with the combined residential and retail bike parking requirement of 88 total bicycle parking spaces.

Proposed Site Plan
Hayward California

Figure
6

2.1.3 Trip Generation

Automobile trip generation by the project was derived from average rates, regression equations, and adjustments contained in the Institute of Transportation Engineer's (ITE) Trip Generation Manual 10th Edition. Given the proximity to BART, additional trip reductions were applied to account for mode split associated with walking and biking to transit. Additional trip reductions were applied for mixed use and retail pass-by per ITE. All trip reductions were approved in advance by City Transportation Staff. The trip generation estimates are presented in Table 8. After appropriate trip reductions, the project is projected to generate 797 daily vehicle trips, 131 vehicle trips in the AM peak hour, and 100 vehicle trips in the PM peak hour. Note: some minor rounding of trips may be occurring.

Table 8 Project Trip Generation

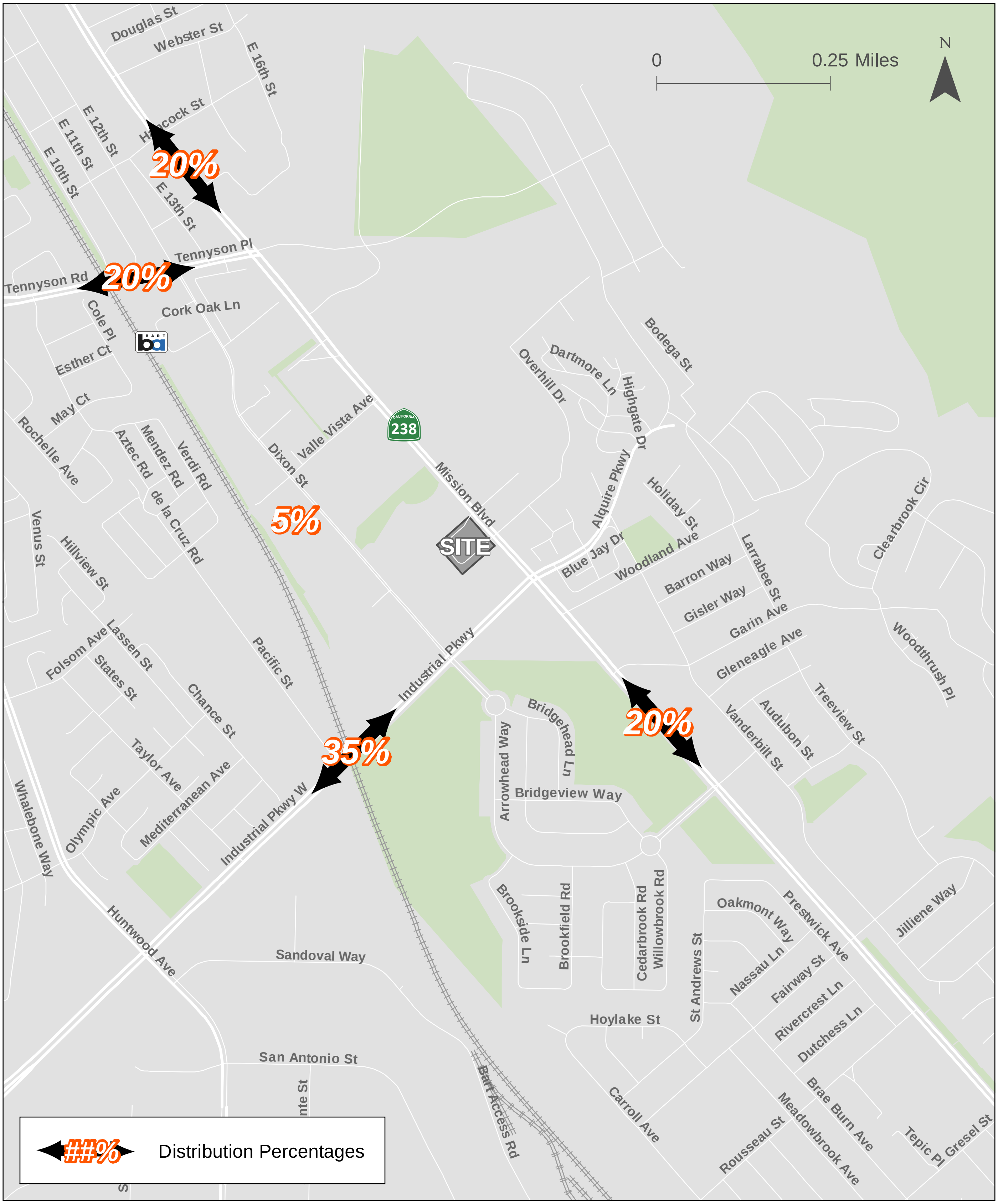
Trip Generation Rates								
Land Use	***Units***	***Daily Rate***	***AM Peak Hour***			***PM Peak Hour***		
			In	***Out***	***Rate***	***In***	***Out***	***Rate***
Multifamily Housing (Mid-rise) (ITE Code 221)	per du	5.4	26%	74%	0.36	61%	39%	0.44
Daycare (ITE Code 565)	ksf	47.6	53%	47%	11.0	47%	53%	11.1
Coffee/Donut Shop w/o Drive Thru (ITE Code 936)	ksf	112.2	51%	49%	101.1	50%	50%	36.3
Trip Generation Estimates								
Land Use	***Size***	***Daily***	***AM Peak Hour***			***PM Peak Hour***		
			In	***Out***	***Total***	***In***	***Out***	***Total***
Multifamily Housing (Mid-rise) (ITE Code 221)	140	762	13	37	50	38	24	62
Daycare (ITE Code 565)	2,715	129	16	14	30	14	16	30
Coffee/Donut Shop w/o Drive Thru (ITE Code 936)	1,800	202	93	89	182	33	33	66
Total		1,093	122	140	262	85	73	158
Trip Generation Reduction								
Reduction	***Rate***	***Daily***	***AM Peak Hour***			***PM Peak Hour***		
			In	***Out***	***Total***	***In***	***Out***	***Total***
BART Reduction (13-Minute Walk)	*10%*	*76*	*1*	*4*	*5*	*4*	*2*	*6*
Mixed-Use Trip Reduction	*10%*	*109*	*12*	*14*	*26*	*9*	*7*	*16*
Retail Pass-By Reduction	*55%*	*111*	*51*	*49*	*100*	*18*	*18*	*36*
Total Reduction		*296*	*64*	*67*	*131*	*30*	*29*	*58*
Total Trip Generation								
	Daily		***AM Peak Hour***			***PM Peak Hour***		
			In	***Out***	***Total***	***In***	***Out***	***Total***
Total	**797**		**58**	**73**	**131**	**55**	**45**	**100**

Source: Institute of Transportation Engineers,10th Edition, 2018
Notes:
DU = dwelling units
Kittelson and Associates, Inc., 2019

2.1.4 Trip Distribution

Project trip distribution is typically developed using the combination of a travel demand model, existing traffic counts and an understanding of existing local and regional travel patterns. For the purposes of this analysis, using the travel demand model is an acceptable method for determining the trip distribution of large projects within a regional context. The distribution from the model was adjusted to match travel patterns from/to proposed project driveway locations. This included permitting u-turns at both adjacent upstream and downstream intersections. All trip distributions were approved in advance by City Transportation Staff.

Figure 7 presents the project trip distribution percentages and Figure 8 presents the project-only turning movements at the study intersections derived from the trip generation and trip distribution discussed in this section, to be used in the Existing Plus Project and Cumulative Plus Project analysis.

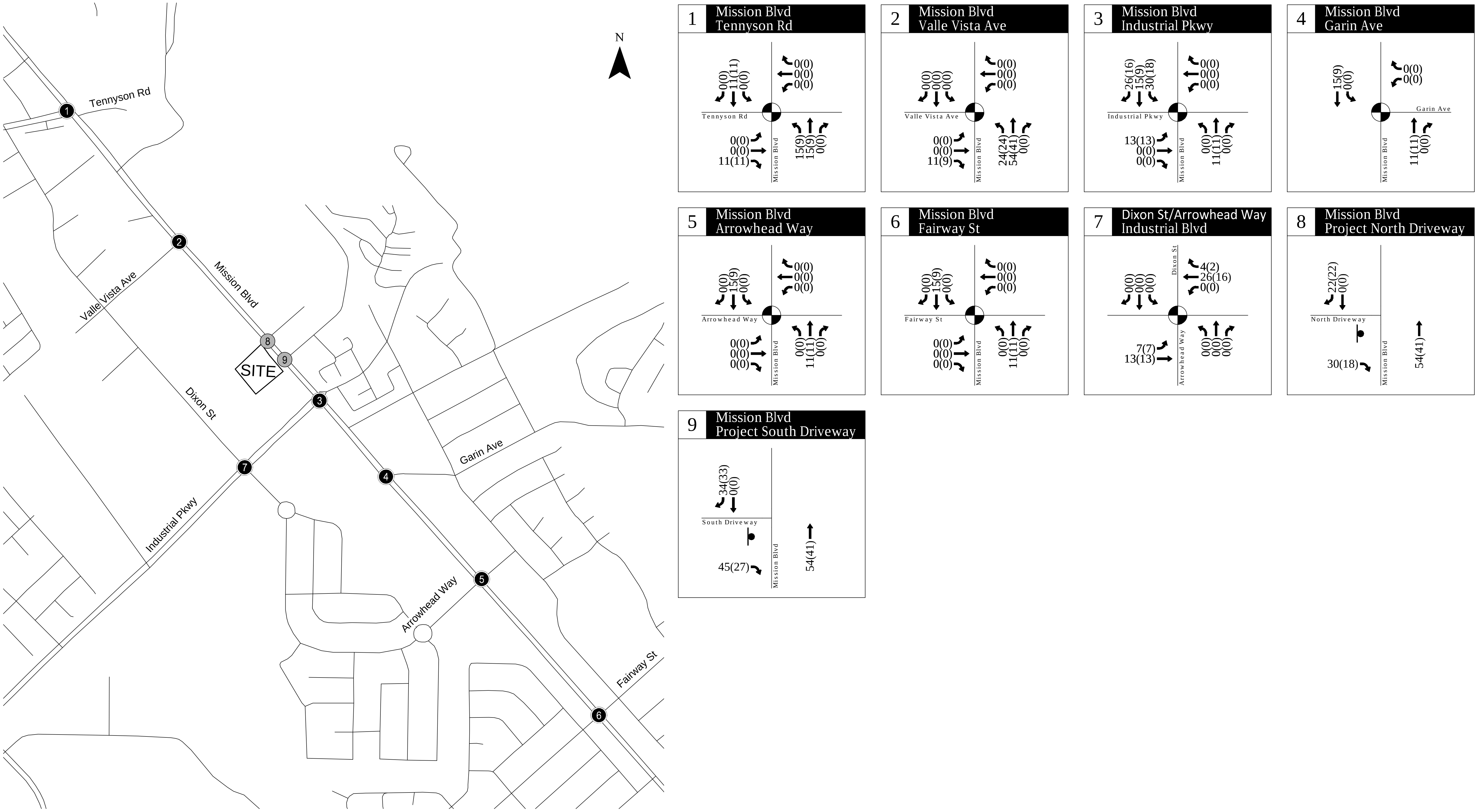


Project Trip Distribution Percentages
Hayward, California

Figure
7

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet



AM(PM) - Traffic Volume

● - Traffic Signal

Project-Only Traffic Volumes
AM & PM Peak Hours
Hayward California

Figure
8

3 EXISTING PLUS PROJECT TRAFFIC CONDITIONS

This chapter discusses the results of the Existing Plus Project analysis including 95th percentile queue lengths at the seven study intersections and automobile level of service.

3.1 EXISTING PLUS PROJECT LEVEL OF SERVICE

The automobile turning movement counts for the Existing Plus Project scenario were developed from the Existing Conditions turning movement counts and the addition of project turning movements described above (and displayed in Figure 8). Figure 9 presents the Existing Plus Project turning movements.

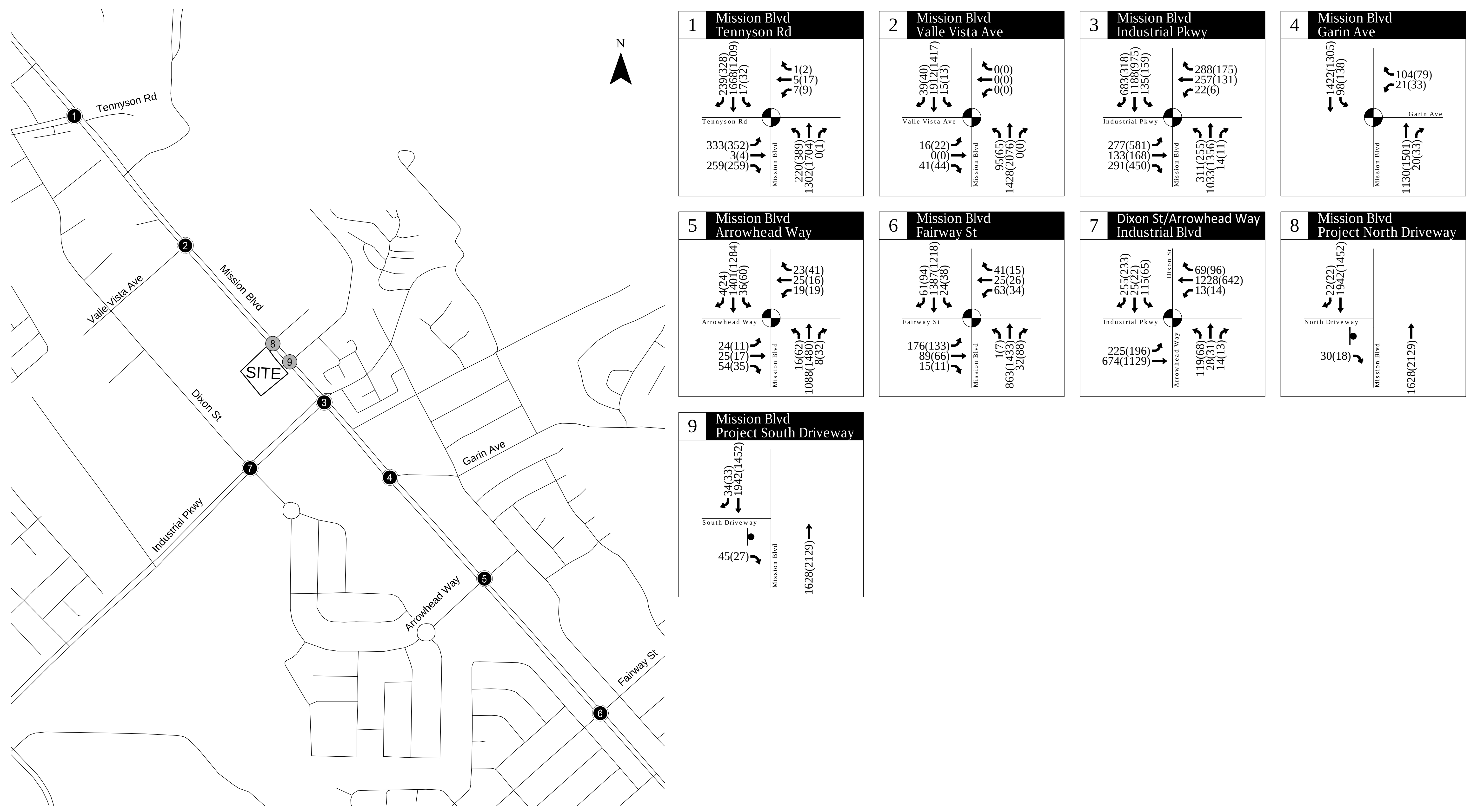
Table 9 presents the Existing Conditions and Existing Plus Project delays and LOS for the study intersections. The table also compares the change in delay between the two scenarios. Appendix C contains the LOS worksheets for this scenario.

All study intersections continue to operate at acceptable levels. Notably, the Mission Boulevard and Industrial Parkway intersections degrades from LOS C to LOS D after the addition of project traffic.

Table 9: Automobile Level of Service, Existing Plus Project

#	Intersection	Control	Peak Hour	Existing		Existing Plus Project		Delay Delta (s/veh)
				Delay (s/veh)	LOS	Delay (s/veh)	LOS	
1	Mission Boulevard & Tennyson Road	Signal	AM	21.8	C	28.3	C	6.5
			PM	30.8	C	34.5	C	3.7
2	Mission Boulevard & Valle Vista Avenue	Signal	AM	12	B	13.2	B	3.7
			PM	10.8	B	16.4	B	5.6
3	Mission Boulevard & Industrial Parkway	Signal	AM	31.1	C	44.9	D	13.8
			PM	30.2	C	47.6	D	17.4
4	Mission Boulevard & Garin Avenue	Signal	AM	6.7	A	9.8	A	3.1
			PM	8.9	A	13.4	B	4.5
5	Mission Boulevard & Arrowhead Way	Signal	AM	7.4	A	9.6	A	2.2
			PM	8.9	A	11.9	B	3
6	Mission Boulevard & Fairway Street	Signal	AM	15.1	B	19.9	B	4.8
			PM	18.7	B	19.8	B	1.1
7	Dixon Street & Industrial Parkway	Signal	AM	21.6	C	22.3	C	0.7
			PM	14	B	14.5	B	0.5

Source: Kittelson & Associates, Inc. 2019



AM(PM) - Traffic Volume

● - Traffic Signal

Existing Plus Project Traffic Volumes
AM & PM Peak Hours
Hayward California

Figure
9

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3.2 95TH PERCENTILE QUEUES

Table 10 presents the 95th percentile queues for right- and left-turn pockets of the seven study intersections under Existing and Existing Plus Project conditions during the AM and PM peak hours. The measure is the probability of a queue developing and extending beyond the storage length. One car length is estimated at 25 feet. Both project driveways are at one-way stop-controlled intersections without turn-pockets, therefore any queues would be onsite and not create any impacts to the city streets. 95th percentile queues under Existing conditions generally do not reach storage capacity. Exceptions include the EBL movement at Mission Boulevard and Industrial Parkway, and the EBL movement of Dixon Street and Industrial Parkway.

After project trips are added, the queues at the SBL movement of Mission Boulevard and Industrial Parkway increases by over 100 feet (four car lengths) in the AM and PM peak hours. The queues at the EBL and SBL movements at the intersection in the AM and PM peak hour, and the WBR movement only in the PM Peak Hour, exceed storage capacity after the addition of project trips to existing conditions. In addition, queues at the NBL movement of Mission Boulevard & Valle Vista Avenue exceeds storage capacity in plus project conditions in the AM peak

Table 10: Existing and Existing Plus Project 95th Percentile Queues

ID	Study Intersections	Lane Group	Storage Length (Feet)	Existing Conditions		Existing plus Project		Delta	
				AM	PM	AM	PM	AM	PM
1	Mission Boulevard & Tennyson Road	**EBL**	470	186	207	202	230	16	23
		EBR	225	72	73	77	80	5	7
		WBR	315	0	0	0	0	0	0
		NBL*	500	201	356	222	295	21	-61
		SBL	234	27	71	45	81	18	10
		SBR	210	133	123	137	205	4	82
2	Mission Boulevard & Valle Vista Avenue	NBL	223	79	67	**232**	116	153	49
		SBL	69	42	28	42	30	0	2
3	Mission Boulevard & Industrial Parkway	EBL	200	155	**323**	**230**	**381**	75	58
		EBR	190	36	62	67	65	31	3
		WBL	200	39	24	61	25	22	1
		WBR	120	88	70	**225**	74	137	4
		NBL	286	180	162	240	189	60	27
		SBL	210	100	175	**288**	**311**	188	136
4	Mission Boulevard & Garin Avenue	WBL	70	24	56	25	35	1	-21
		NBR	100	2	1	19	24	17	23
		SBL	200	54	190	112	154	58	-36
		EBL	150	27	27	29	17	2	-10

ID	Study Intersections	Lane Group	Storage Length (Feet)	Existing Conditions		Existing plus Project		Delta	
				AM	**PM**	**AM**	**PM**	**AM**	**PM**
5	Mission Boulevard & Arrowhead Way	WBL	150	24	39	25	25	1	-14
		*NBL**	300	18	83	16	43	-2	-40
		SBL	300	49	77	54	79	5	2
6	Mission Boulevard & Fairway Street	WBR	120	0	0	0	0	0	0
		NBL	200	5	26	6	19	1	-7
		*SBL**	303	18	67	22	33	4	-34
7	Dixon Street & Industrial Parkway	EBL	72	**254**	**200**	**266**	**220**	12	20
		WBL	89	14	20	27	28	13	8
		NBL	120	111	67	111	67	0	0
		SBR	100	58	54	59	54	1	0

Source: Kittelson & Associates, Inc. 2019

Bold indicates queue length exceeds storage capacity

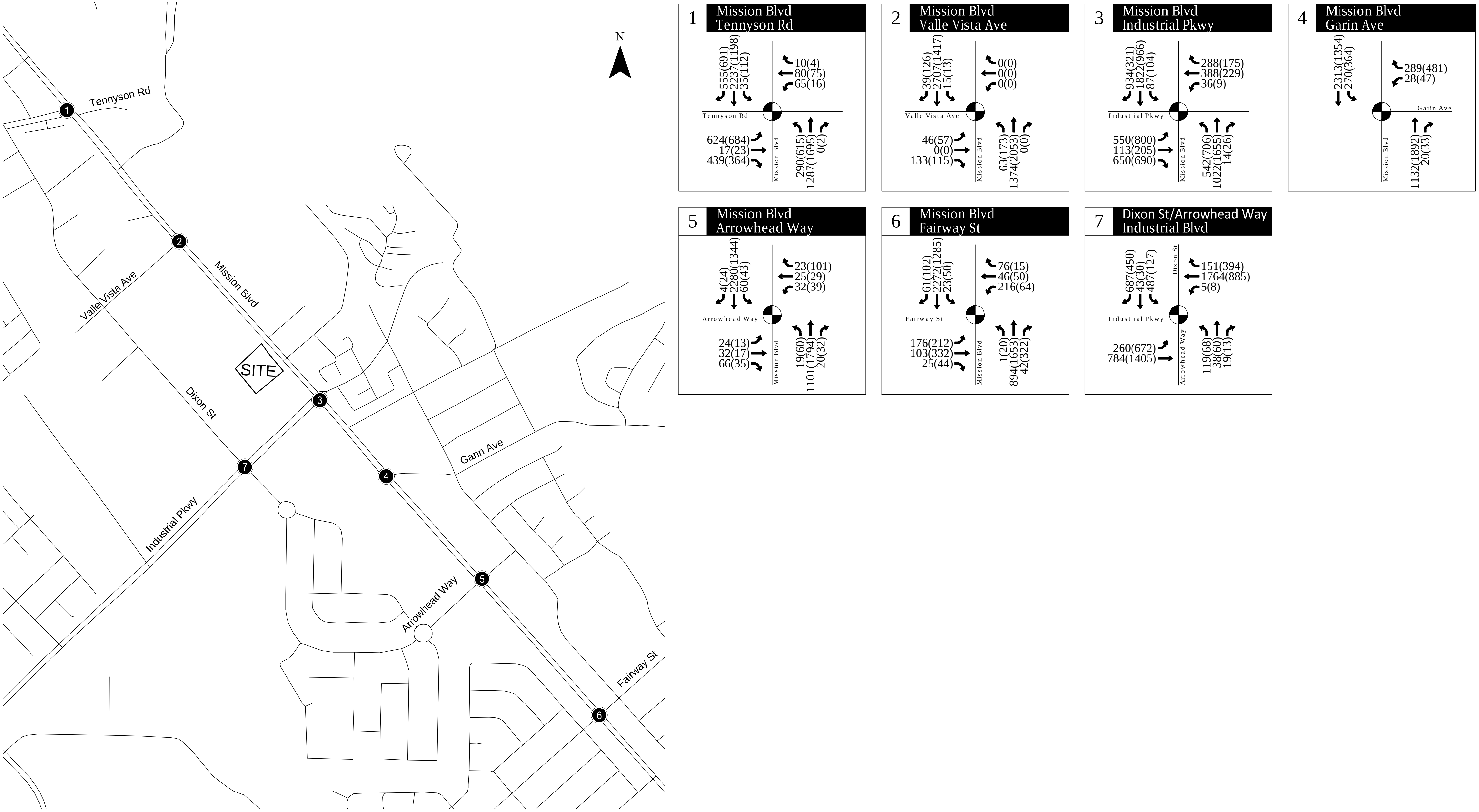
4 CUMULATIVE CONDITIONS

The potential impacts to the transportation system were evaluated for the Cumulative Year 2035 Condition. The impacts to the intersections were evaluated using projected peak hour traffic volumes using a traffic model.

4.1 DEVELOPMENT OF CUMULATIVE 2035 DEMAND

The model includes future development throughout the region. To develop cumulative demand of the project area, Kittelson used the Hayward General Plan cumulative 2035 traffic model. The model includes all planned and buildout developments per the City's General Plan. The cumulative assumptions included in the City General Plan model for the three traffic analysis zones, 708, 709 and 761, that cover the South Hayward BART/Mission Boulevard Specific Plan include up to 2,300 residential units and 224 jobs, and were used to generate the cumulative no-project forecasts for this study.

The automobile turning movement counts for the Cumulative Plus Project scenario were developed from the Cumulative No-Project turning movement volumes (derived from the model) plus the addition of project turning movements as described above. Figure 10 presents the Cumulative No-Project volumes derived from the travel demand model and Figure 11 presents the Cumulative Plus Project volumes.



AM(PM) - Traffic Volume
● - Traffic Signal

2035 Cumulative Traffic Volumes
AM & PM Peak Hours
Hayward California

Figure
10

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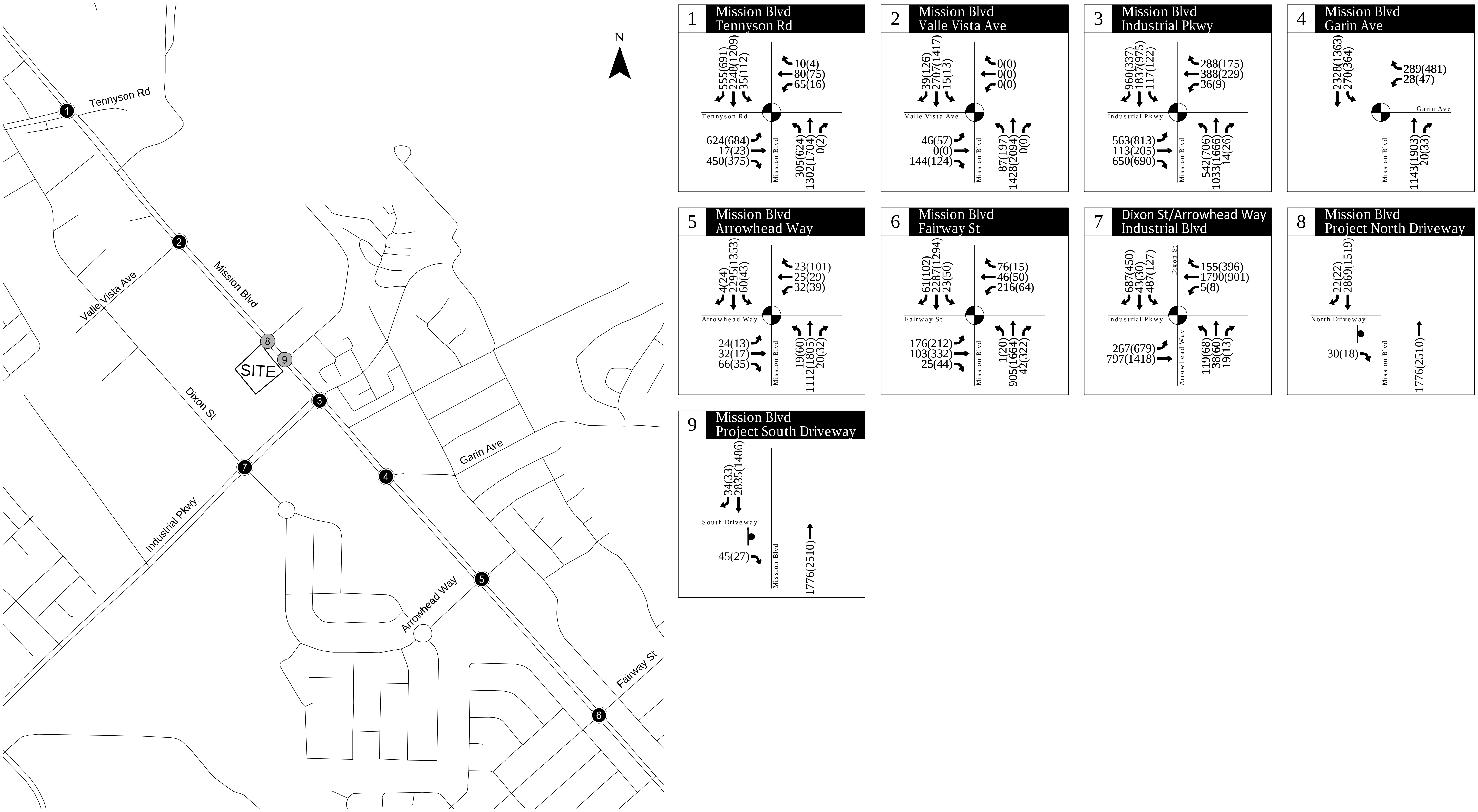
KITTELSON & ASSOCIATES



AM(PM) - Traffic Volume

◐ - Traffic Signal

2035 Cumulative Plus Project Traffic Volumes
AM & PM Peak Hours
Hayward California

Figure
11

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4.2 CUMULATIVE AND CUMULATIVE PLUS PROJECT LEVEL OF SERVICE

Table 11 presents the Cumulative 2035 and Cumulative 2035 Plus Project delays and LOS for the study intersections. The table also compares the change in delay between the two scenarios. Appendix D and Appendix E contains the LOS worksheets.

As shown in the table, during the AM and PM peak hour, four intersections operate unacceptably (LOS F) under Cumulative 2035 conditions and under Cumulative 2035 Plus Project conditions. However, the delay due to the project does not increase by more than five seconds compared to the Cumulative No-Project. Therefore, the impacts at these intersections are less-than-significant.

The only intersection that exceeds the City thresholds is the Mission Boulevard and Industrial Parkway intersection, which is at LOS F and has a 5.5 second increase in delay after the addition of project trips during the AM Peak hour. This is considered an existing cumulative deficiency identified in the Hayward 2040 General Plan, therefore it is not considered a project impact. Signal optimization improvements to reduce delay are discussed in the next section to be addressed as part of the conditions of approval.

There are no significant impacts to the six other study intersections in the cumulative plus project scenario.

Table 11: Automobile Level of Service, Cumulative 2035 Plus Project

#	Intersection	Control	Peak Hour	Cumulative		Cumulative + Project		Delay Delta (s/veh)
				Delay (s/veh)	LOS	Delay (s/veh)	LOS	
1	Mission Boulevard & Tennyson Road	Signal	AM	**109.2**	**F**	**111.7**	**F**	2.5
			PM	59.1	E	59.9	E	0.8
2	Mission Boulevard & Valle Vista Avenue	Signal	AM	61.9	E	65.9	E	4
			PM	33.9	C	34.7	C	0.8
3	Mission Boulevard & Industrial Parkway	Signal	AM	**133.2**	**F**	**138.7**	**F**	**5.5**
			PM	**81.2**	**F**	**84.6**	**F**	3.4
4	Mission Boulevard & Garin Avenue	Signal	AM	16.9	B	17.0	B	0.1
			PM	**112.8**	**F**	**114.3**	**F**	1.5
5	Mission Boulevard & Arrowhead Way	Signal	AM	25.5	C	26.6	C	1.1
			PM	17.1	B	17.3	B	0.2
6	Mission Boulevard & Fairway Street	Signal	AM	**152.6**	**F**	**155.0**	**F**	2.4
			PM	**152.2**	**F**	**154.1**	**F**	1.9
7	Dixon Street & Industrial Parkway	Signal	AM	**190.2**	**F**	**194.4**	**F**	4.2
			PM	**121.0**	**F**	**123.3**	**F**	2.3

Source: Kittelson & Associates, Inc. 2019
Bold indicates below City standard; **Bold and shaded** indicates significant impact

Table 12 shows the delays and LOS for the new project driveway intersections for all project study scenarios. As shown in the table, the driveways are expected to operate at an acceptable LOS during both peak hours.

Table 12: Automobile Level of Service, New Project Driveways

Scenario	Intersection	Control	Peak Hour	Delay (s/veh)	LOS
Existing Plus Project	Mission Blvd/ North Driveway	Stop-controlled	AM	17.2	C
			PM	8.9	A
	Mission Blvd/ South Driveway		AM	16.2	C
			PM	12.9	B
Cumulative 2035 Plus Project	Mission Blvd/ North Driveway	Stop-controlled	AM	18.1	C
			PM	9.3	A
	Mission Blvd/ South Driveway		AM	25.4	D
			PM	13.1	B

Source: Kittelson & Associates, Inc. 2019

4.3 95TH PERCENTILE QUEUES

Table 13 presents the 95th percentile queues for left- and right-turn pockets of the seven study intersections for the AM and PM peak hours. Under Cumulative conditions, several intersection queue lengths exceed storage capacity. The 95th percentile queues on all movements of the Mission Boulevard and Arrowhead Way and the Mission Boulevard and Fairway Street intersections do not exceed storage capacity. The only intersection which exceeds storage capacity after the addition of project traffic is Mission Boulevard and Industrial Parkway. The queue length of the SBL movement increases by 70 feet (3 car lengths) in the AM peak hour. All other movements which exceed storage capacity do so in both Cumulative and Cumulative Plus Project conditions.

Table 13: 95th Percentile Queues Under Cumulative and Cumulative Plus Project Conditions

ID	Study Intersections	Lane Group	Storage Length (Feet)	Cumulative		Cumulative Plus Project		Delta	
				AM	PM	AM	PM	AM	PM
1	Mission Boulevard & Tennyson Road	**EBL**	470	410	**527**	410	**527**	0	04
		EBR	225	**267**	97	**286**	97	19	0
		WBR	315	0	0	0	0	0	0
		NBL*	500	308	**577**	327	**589**	19	12
		SBL	234	84	**319**	84	**319**	0	0
		SBR	210	**526**	**585**	**528**	**591**	2	6
2		NBL	223	143	**427**	214	**485**	71	58

ID	Study Intersections	Lane Group	Storage Length (Feet)	Cumulative		Cumulative Plus Project		Delta	
				AM	PM	AM	PM	AM	PM
	Mission Boulevard & Valle Vista Avenue	SBL	69	42	18	42	18	0	0
3	Mission Boulevard & Industrial Parkway	EBL	200	**280**	**346**	**297**	**356**	17	10
		EBR	190	**304**	**218**	**304**	**219**	0	1
		WBL	200	100	32	100	32	0	0
		WBR	120	**225**	74	**227**	74	2	0
		NBL	286	**544**	**721**	**544**	**721**	0	0
		SBL	210	164	169	**234**	198	70	29
4	Mission Boulevard & Garin Avenue	WBL	70	30	45	30	45	0	0
		NBR	100	19	25	19	25	0	0
		SBL	200	**387**	**488**	**387**	**488**	0	0
5	Mission Boulevard & Arrowhead Way	EBL	150	29	20	29	20	0	0
		WBL	150	37	41	37	41	0	0
		*NBL**	300	16	23	16	22	0	-1
		SBL	300	79	61	79	61	0	0
6	Mission Boulevard & Fairway Street	WBR	120	10	0	10	0	0	0
		NBL	200	6	36	6	36	0	0
		*SBL**	303	13	42	13	42	0	0
7	Dixon Street & Industrial Parkway	EBL	72	**321**	**923**	**330**	**932**	9	9
		WBL	89	14	20	14	20	0	0
		NBL	120	**206**	69	**206**	69	0	0
		SBR	100	**617**	**216**	**617**	**218**	0	2

Source: Kittelson & Associates, Inc. 2019
Bold indicates queue length exceeds storage capacity

5 SIGNAL OPTIMIZATION IMPROVEMENTS

The City of Hayward Traffic Study Guidelines state that an intersection results in a significant impact, if:

> The intersection operates at Level of Service F without the project under Existing, Background or Cumulative conditions, and the addition of the project under Existing plus Project, Project or Cumulative plus Project conditions results in an increase in the average control delay of 5.0 seconds or greater when compared to the associated no project condition.

Under Cumulative conditions, the Mission Boulevard and Industrial Parkway intersection is forecast to operate to operate at LOS F with 133.2 seconds of delay during the AM Peak. With the addition of project traffic under Cumulative Plus Project conditions, the intersection is forecast to operate at LOS F with an average delay of 138.7 seconds, an increase of 5.5 seconds. This is greater than the City of Hayward 5.0 second increase threshold with respect to the intersection under Cumulative no-project conditions. However, this is considered an existing cumulative deficiency identified in the General Plan, therefore it is not considered a project impact.

Based on General Plan Policy M-4.4 (Systems Management) which states:

> The City shall encourage alternatives to road construction and expansion (e.g., adaptive signals and coordinated signals) as necessary for improving traffic flows.

The intersection delays can be reduced back to the average delay of no-project conditions by optimizing the intersection's signal timing. Signal optimization would reduce the average delay after the addition of project traffic to 130.6 seconds, which is below the average delay in Cumulative No-Project conditions, and therefore below the 5.0 second increase threshold.

The signal timing optimization would adjust the timing for each phase, but does not modify the cycle-length or coordination between signals. This would occur either as part of the traffic signal's adaptive control system, or as part of periodic signal timing done by the City to be addressed as part of the conditions of approval.

6 CONGESTION MANAGEMENT PROGRAM

The Alameda County Transportation Commission (Alameda CTC) coordinates transportation planning efforts throughout Alameda County and programs local, regional, State and federal funding for project implementation. Additionally, it prepares the Congestion Management Program (CMP), a plan mandated by California law to describe the strategies to address congestion problems on the CMP network, which includes State highways and principal arterials.

The CMP requires analysis of the Metropolitan Transportation System (MTS) roadway and transit, uses level of service standards as a means to measure congestion, and has established level of service standards to determine how local governments meet the standards of the CMP. It also requires analysis of impacts to cyclists on the Countywide Bicycle Network and impacts to pedestrians within the Areas of Countywide Significance identified in the Alameda Countywide Pedestrian Plan.

Since the Project does generate 100 p.m. peak hour trips, a CMP analysis on MTS and CMP roadway segments and transit facilities would normally be required should this project need a full EIR to comply with CEQA. However, land uses with similar trip generation were included as part of the South Hayward BART/Mission Boulevard Form-Based Code Specific Plan that was cleared environmentally at a Programmatic Level in 2012. During that study, a CMP analysis was conducted on the roadway segments to satisfy the Land Use Analysis Program required by the Alameda CTC. Roadways nearby the Project included Mission Boulevard, Harder Road, Tennyson Road, Industrial Parkway and Winton Road. The 2012 Specific Plan analysis included land uses for the full extent of the South Hayward BART/Mission Boulevard Specific Plan, of which Meta Housing (The Project) is a small part. The CMP analysis did not find any regional impacts to MTS and CMP roadways for the full Specific Plan. Therefore, it is not expected that the Project would incur any new significant impacts to MTS and CMP roadway segments and transit facilities.

7 CONCLUSION

This report presented the findings, conclusions and transportation impact analysis conducted by Kittelson & Associates for the Meta Housing Mixed-Use Development Traffic Study. The project site is located in Hayward, California at 29497-29553 Mission Boulevard. The project would consist of:

- 140 residential units of a mid-rise residential
- 1,800 square feet of a coffee shop
- 2,715 square feet of daycare

The project provides 101 total vehicle parking spaces (4 of which reserved for motorcycles) and up to 89 total bike parking spaces. The project provides enough combined short term and long-term bicycle parking spaces per the 88 space requirement.

The traffic generated by the proposed project results in no impacts at the seven study intersections under the Existing Plus Project conditions, and one deficient location under 2035 Cumulative Plus Project conditions. Although several intersections in Cumulative conditions without the project operate at LOS F, the delay from project trips on the AM and PM cumulative scenarios at six of the seven study intersections is less than five seconds with no significant impact due to delay. The additional delay to the Industrial Parkway and Mission Boulevard Intersection in the Cumulative Plus Project scenario under AM peak hour conditions exceeds five seconds. However, this is considered an existing cumulative deficiency identified in the General Plan, therefore it is not considered a project impact. The proposed optimization of the intersection's signal timing will be addressed as part of the conditions of approval to reduce intersection delays.

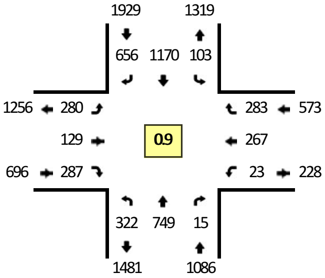
95th percentile queues of the seven study intersections are generally below queue storage capacity in Existing and Existing Plus Project conditions. The SBL movement of Industrial Parkway and Dixon Street in the AM and PM Peak Hour, and the WBR movement in only the AM peak hour, exceed capacity after project trips are added. In addition, the NBL movement of Mission Boulevard and Valle Vista Avenue also exceeds capacity after project trips are added. In 2035 conditions, most of the study intersections have at least one movement with queue length exceeding storage capacity. The SBL movement of Mission Boulevard and Industrial Parkway is the lone movement under 2035 Cumulative conditions which exceeds capacity only after the addition of project trips.

APPENDIX A: TRAFFIC COUNTS

Attachment V

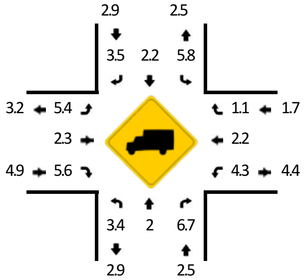
Type of peak hour being reported: Intersection Peak
Method for determining peak hour: Total Entering Volume

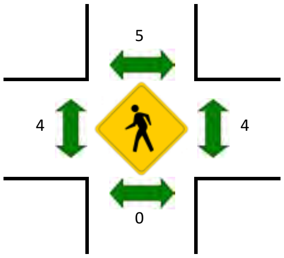
LOCATION: Mission Blvd -- Industrial Pkwy/Alquire Pkwy
QC JOB #: 14937701
CITY/STATE: Alameda, CA
DATE: Wed, Apr 10 2019

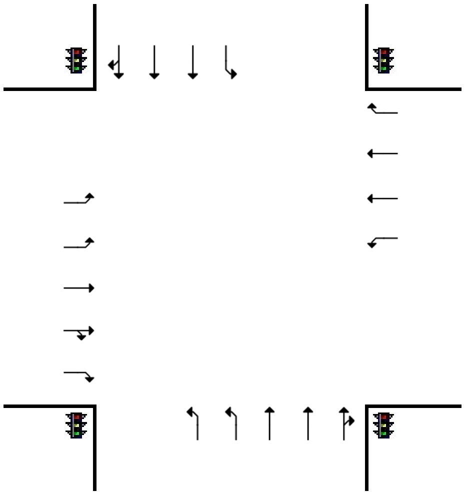


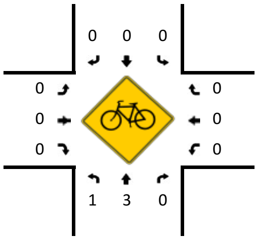
Peak-Hour: 7:10 AM -- 8:10 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

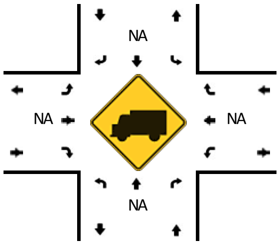
Quality Counts
DATA THAT DRIVES COMMUNITIES

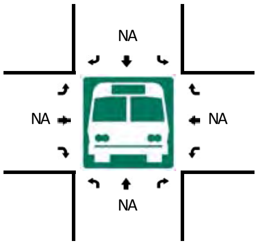












5-Min Count Period Beginning At	Mission Blvd (Northbound)				Mission Blvd (Southbound)				Industrial Pkwy/Alquire Pkwy (Eastbound)				Industrial Pkwy/Alquire Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	13	40	1	0	0	141	69	0	9	10	10	0	1	9	11	0	314	
7:05 AM	37	54	4	0	5	118	47	0	13	5	15	2	3	15	6	0	324	
7:10 AM	31	46	1	0	7	99	51	2	31	8	19	4	1	27	10	0	337	
7:15 AM	16	45	2	0	5	137	68	0	17	6	28	1	7	6	12	0	350	
7:20 AM	24	83	4	0	3	109	46	0	3	8	11	0	0	18	23	0	332	
7:25 AM	25	52	0	0	6	92	32	3	26	8	21	2	2	17	15	0	301	
7:30 AM	18	57	1	0	1	95	51	1	17	7	22	0	4	31	21	0	326	
7:35 AM	37	83	1	0	6	101	77	2	17	2	20	0	0	7	16	0	369	
7:40 AM	27	67	0	0	11	100	54	1	24	9	16	0	1	27	22	0	359	
7:45 AM	40	79	0	1	6	64	58	1	39	24	29	1	3	30	35	0	410	
7:50 AM	21	76	2	0	2	96	49	2	40	12	30	1	0	25	29	0	385	
7:55 AM	26	66	2	0	8	121	81	4	7	9	29	0	0	12	32	0	397	4204
8:00 AM	26	53	2	0	18	69	38	0	29	22	26	2	3	34	29	0	351	4241
8:05 AM	30	42	0	0	11	87	51	3	18	14	36	1	2	33	39	0	367	4284
8:10 AM	20	63	0	0	10	102	52	1	17	12	23	2	0	17	15	0	334	4281
8:15 AM	27	42	2	0	11	93	66	3	5	9	25	0	0	35	24	0	342	4273
8:20 AM	30	44	1	0	9	73	41	0	14	9	26	4	2	23	26	0	302	4243
8:25 AM	10	46	1	0	7	76	56	0	22	8	17	3	0	15	9	0	270	4212
8:30 AM	23	59	0	0	10	93	72	0	5	3	18	1	0	6	15	0	305	4191
8:35 AM	17	38	0	0	4	79	54	0	19	5	15	1	2	22	15	0	271	4093
8:40 AM	23	32	0	0	11	54	49	4	26	8	13	3	0	13	9	0	245	3979
8:45 AM	18	44	5	0	2	85	84	2	16	9	15	3	1	9	14	0	307	3876
8:50 AM	25	47	1	0	6	57	58	1	11	9	11	1	0	10	5	0	242	3733
8:55 AM	26	52	0	0	6	62	61	6	17	4	15	1	0	12	12	0	274	3610

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	348	884	16	4	64	1124	752	28	344	180	352	8	12	268	384	0	4768
Heavy Trucks	4	12	4		4	8	28		8	4	16		0	0	4		92
Pedestrians		0				4				8				8			20
Bicycles	1	2	0		0	0	0		0	0	0		0	0	0		3
Railroad																	
Stopped Buses																	

Comments:

Report generated on 4/18/2019 3:02 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Attachment V

Type of peak hour being reported: Intersection Peak

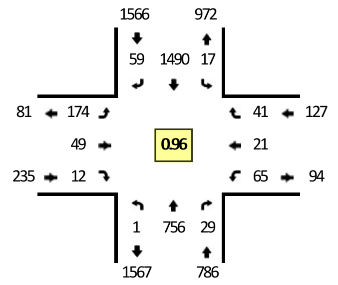
Method for determining peak hour: Total Entering Volume

LOCATION: Mission Blvd -- Fairway St

CITY/STATE: Hayward, CA

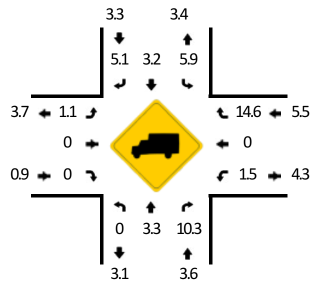
QC JOB #: 14937721

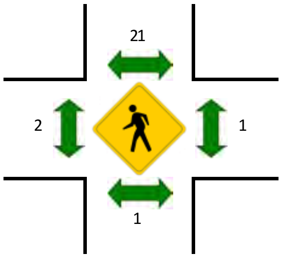
DATE: Wed, Apr 10 2019

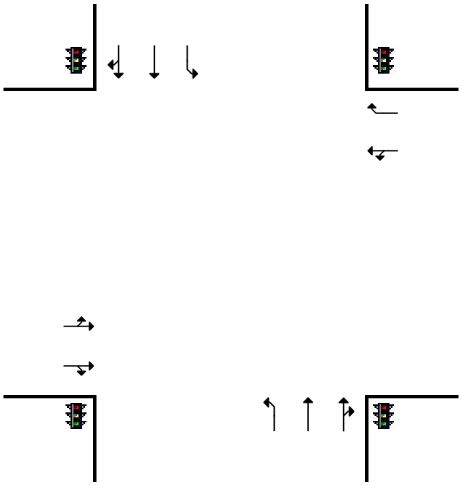


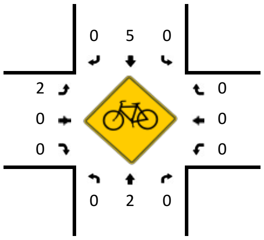
Peak-Hour: 7:00 AM -- 8:00 AM

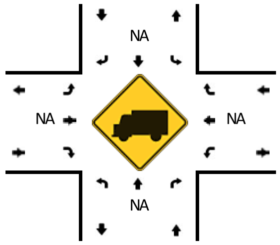
Peak 15-Min: 7:05 AM -- 7:20 AM

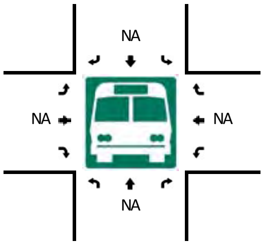












5-Min Count Period Beginning At	Mission Blvd (Northbound)				Mission Blvd (Southbound)				Fairway St (Eastbound)				Fairway St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	56	2	0	0	154	5	0	11	2	2	0	6	0	1	0	239	
7:05 AM	0	60	1	0	1	148	4	0	14	0	0	0	5	0	5	0	238	
7:10 AM	0	43	3	0	1	142	5	0	11	1	0	0	4	2	3	0	215	
7:15 AM	0	70	4	0	2	134	8	1	16	3	0	0	8	2	8	0	256	
7:20 AM	0	49	2	0	2	122	6	0	14	1	2	0	3	4	5	0	210	
7:25 AM	0	80	1	0	3	127	3	0	14	3	2	0	2	0	1	0	236	
7:30 AM	0	56	2	0	1	129	6	0	19	3	0	0	7	2	3	0	228	
7:35 AM	0	70	3	0	3	90	6	0	16	4	3	0	4	2	4	0	205	
7:40 AM	0	91	1	0	0	98	3	0	20	6	0	0	8	2	4	0	233	
7:45 AM	0	63	2	0	0	120	4	0	20	8	0	0	7	2	3	0	229	
7:50 AM	1	66	5	0	3	114	4	0	12	7	0	0	5	2	2	0	221	
7:55 AM	0	52	3	0	0	112	5	0	7	11	3	0	6	3	2	0	204	2714
8:00 AM	0	57	2	0	3	105	8	1	11	10	1	0	7	2	4	0	211	2686
8:05 AM	0	46	6	0	1	125	1	1	15	12	1	0	3	1	3	0	215	2663
8:10 AM	0	52	1	0	2	96	7	1	12	21	3	0	3	3	2	0	203	2651
8:15 AM	0	46	1	0	1	95	10	1	15	9	2	0	12	9	4	0	205	2600
8:20 AM	0	50	2	0	3	70	8	1	11	0	2	0	6	3	2	0	158	2548
8:25 AM	0	39	2	0	0	70	5	0	7	3	1	0	9	1	0	0	137	2449
8:30 AM	0	53	1	0	0	65	11	0	11	4	0	0	5	2	2	0	154	2375
8:35 AM	0	56	2	0	0	65	3	0	13	2	2	0	2	13	2	0	160	2330
8:40 AM	1	43	3	1	1	65	9	0	11	0	0	0	10	4	3	0	151	2248
8:45 AM	0	42	2	0	1	45	11	0	15	8	1	0	2	3	0	0	130	2149
8:50 AM	0	38	3	0	1	46	6	2	11	7	0	0	2	10	2	0	128	2056
8:55 AM	0	42	2	0	0	61	8	0	9	4	0	0	1	1	0	0	128	1980

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	692	32	0	16	1696	68	4	164	16	0	0	68	16	64	0	2836
Heavy Trucks	0	24	8		4	60	8		8	0	0		0	0	16		128
Pedestrians		0				0				0				0			0
Bicycles	0	1	0		0	2	0		0	0	0		0	0	0		3
Railroad																	
Stopped Buses																	

Comments:

Report generated on 4/18/2019 3:03 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Attachment V

Type of peak hour being reported: Intersection Peak

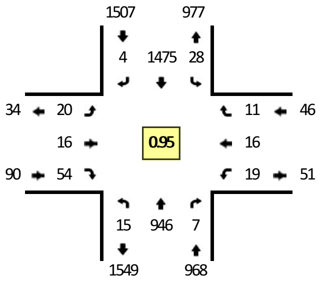
Method for determining peak hour: Total Entering Volume

LOCATION: Mission Blvd -- Arrowhead Way

QC JOB #: 14937715

CITY/STATE: Alameda, CA

DATE: Wed, Apr 10 2019

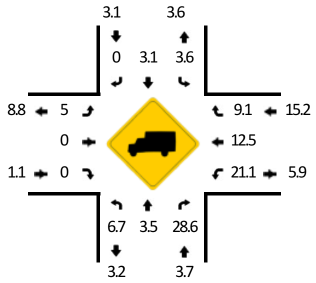


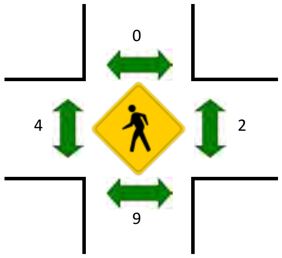
Peak-Hour: 7:00 AM -- 8:00 AM

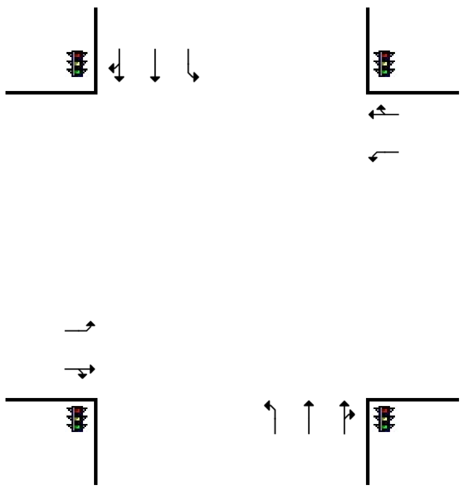
Peak 15-Min: 7:05 AM -- 7:20 AM

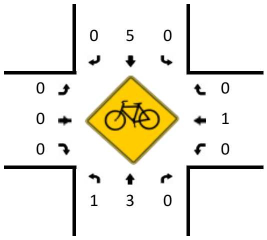
Quality Counts

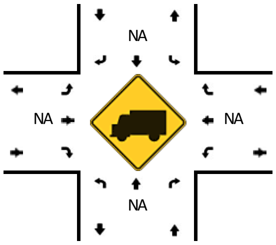
DATA THAT DRIVES COMMUNITIES

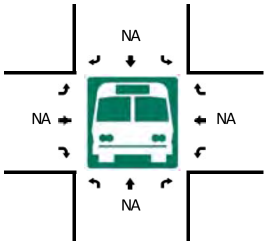












5-Min Count Period Beginning At	Mission Blvd (Northbound)				Mission Blvd (Southbound)				Arrowhead Way (Eastbound)				Arrowhead Way (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	2	62	1	0	1	154	0	0	1	2	2	0	2	0	0	0	227	
7:05 AM	0	69	0	0	2	114	0	0	1	0	5	0	4	0	1	0	196	
7:10 AM	1	53	1	0	3	150	1	0	2	1	3	0	2	2	2	0	221	
7:15 AM	1	102	1	0	2	156	0	0	3	0	5	0	0	0	0	0	270	
7:20 AM	2	66	0	0	1	107	1	0	2	0	5	0	1	0	1	0	186	
7:25 AM	1	80	0	0	0	123	1	0	2	1	3	0	2	0	0	0	213	
7:30 AM	2	67	1	0	6	138	0	0	0	0	3	0	2	2	1	0	222	
7:35 AM	1	103	1	0	1	94	0	0	2	2	7	0	2	1	1	0	215	
7:40 AM	0	117	0	0	1	92	0	0	2	2	4	0	1	1	3	0	223	
7:45 AM	1	86	2	0	2	125	0	0	2	1	7	0	1	2	1	0	230	
7:50 AM	1	85	0	0	5	111	1	0	1	1	7	0	2	7	1	0	222	
7:55 AM	2	56	0	1	4	111	0	0	2	6	3	0	0	1	0	0	186	2611
8:00 AM	1	56	3	0	6	91	0	0	6	3	4	0	5	3	3	0	181	2565
8:05 AM	0	69	0	0	4	126	0	0	2	6	3	0	2	3	5	0	220	2589
8:10 AM	3	60	0	0	3	112	1	1	0	3	3	0	1	5	7	0	199	2567
8:15 AM	4	70	3	0	7	121	1	1	0	0	5	0	0	4	3	0	219	2516
8:20 AM	2	66	0	0	1	90	1	0	1	1	5	0	2	5	3	0	177	2507
8:25 AM	2	43	0	0	19	66	1	0	0	3	6	0	0	3	0	0	143	2437
8:30 AM	1	60	0	0	8	74	1	0	1	2	1	0	1	0	2	0	151	2366
8:35 AM	6	58	1	0	21	62	0	2	1	1	5	0	0	1	2	0	160	2311
8:40 AM	2	54	0	0	12	74	1	0	1	2	2	0	0	2	2	0	152	2240
8:45 AM	1	69	1	0	17	61	0	2	3	1	0	0	1	1	1	0	158	2168
8:50 AM	0	43	0	0	23	52	1	2	0	3	2	0	2	3	2	0	133	2079
8:55 AM	0	58	0	0	7	56	0	1	2	3	3	0	1	0	1	0	132	2025

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	8	896	8	0	28	1680	4	0	24	4	52	0	24	8	12	0	2748
Heavy Trucks	0	40	0		4	64	0		0	0	0		8	0	4		120
Pedestrians		4				0				0				0			4
Bicycles	0	1	0		0	2	0		0	0	0		0	1	0		4
Railroad																	
Stopped Buses																	

Comments:

Report generated on 4/18/2019 3:02 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

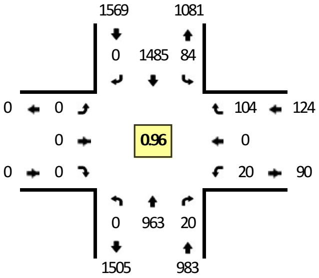
Method for determining peak hour: Total Entering Volume

LOCATION: Mission Blvd -- Garin Ave

CITY/STATE: Alameda, CA

QC JOB #: 14937713

DATE: Wed, Apr 10 2019

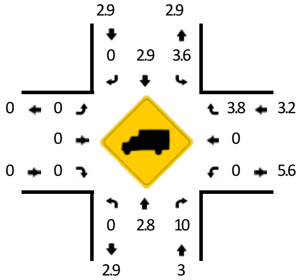


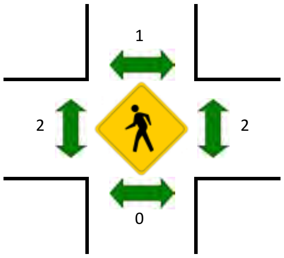
Peak-Hour: 7:00 AM -- 8:00 AM

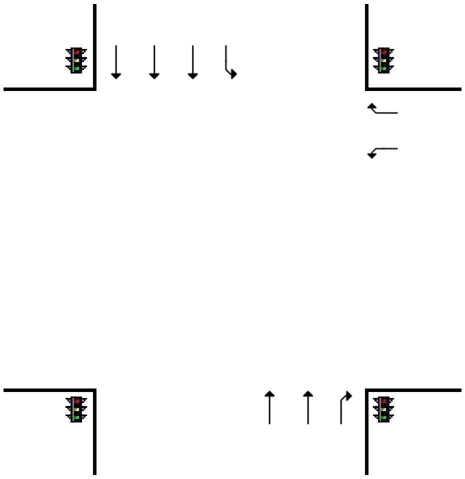
Peak 15-Min: 7:15 AM -- 7:30 AM

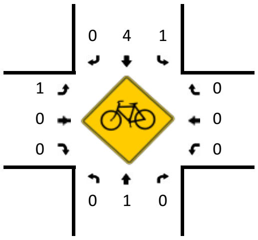
Quality Counts

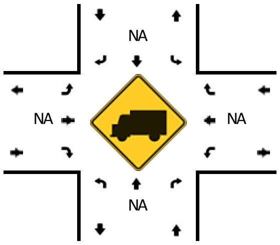
DATA THAT DRIVES COMMUNITIES

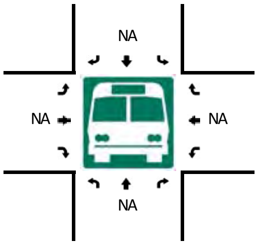












5-Min Count Period Beginning At	Mission Blvd (Northbound)				Mission Blvd (Southbound)				Garin Ave (Eastbound)				Garin Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	64	3	0	5	158	0	2	0	0	0	0	3	0	11	0	246	
7:05 AM	0	74	1	0	1	119	0	0	0	0	0	0	3	0	8	0	206	
7:10 AM	0	57	0	0	8	126	0	1	0	0	0	0	1	0	9	0	202	
7:15 AM	0	90	2	0	4	165	0	2	0	0	0	0	1	0	10	0	274	
7:20 AM	0	79	6	0	2	115	0	1	0	0	0	0	2	0	4	0	209	
7:25 AM	0	77	5	0	0	119	0	0	0	0	0	0	2	0	10	0	213	
7:30 AM	0	69	0	0	9	117	0	1	0	0	0	0	0	0	8	0	204	
7:35 AM	0	92	1	0	8	104	0	3	0	0	0	0	2	0	9	0	219	
7:40 AM	0	102	0	0	7	102	0	1	0	0	0	0	3	0	5	0	220	
7:45 AM	0	124	1	0	6	105	0	1	0	0	0	0	0	0	14	0	251	
7:50 AM	0	74	1	0	7	121	0	1	0	0	0	0	0	0	10	0	214	
7:55 AM	0	61	0	0	13	134	0	1	0	0	0	0	3	0	6	0	218	2676
8:00 AM	0	72	0	0	7	69	0	1	0	0	0	0	4	0	11	0	164	2594
8:05 AM	0	72	2	0	13	129	0	1	0	0	0	0	0	0	9	0	226	2614
8:10 AM	0	57	2	0	9	127	0	0	0	0	0	0	4	0	8	0	207	2619
8:15 AM	0	67	2	0	5	110	0	1	0	0	0	0	3	0	14	0	202	2547
8:20 AM	0	75	1	0	7	91	0	0	0	0	0	0	1	0	10	0	185	2523
8:25 AM	0	41	1	0	4	97	0	0	0	0	0	0	2	0	6	0	151	2461
8:30 AM	0	59	4	0	11	100	0	1	0	0	0	0	2	0	6	0	183	2440
8:35 AM	0	55	1	0	6	78	0	1	0	0	0	0	1	0	8	0	150	2371
8:40 AM	0	55	5	0	5	73	0	1	0	0	0	0	1	0	8	0	148	2299
8:45 AM	0	71	1	0	7	97	0	1	0	0	0	0	2	0	8	0	187	2235
8:50 AM	0	51	0	0	7	62	0	0	0	0	0	0	1	0	5	0	126	2147
8:55 AM	0	61	1	0	5	65	0	1	0	0	0	0	0	0	11	0	144	2073

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	984	52	0	24	1596	0	12	0	0	0	0	20	0	96	0	2784
Heavy Trucks	0	56	8		0	56	0		0	0	0		0	0	4		124
Pedestrians		0				4				0				0			4
Bicycles	0	0	0		1	2	0		1	0	0		0	0	0		4
Railroad																	
Stopped Buses																	

Comments:

Report generated on 4/18/2019 3:02 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Attachment V

Type of peak hour being reported: Intersection Peak

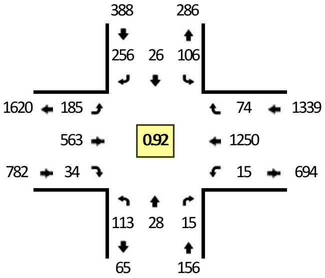
Method for determining peak hour: Total Entering Volume

LOCATION: Dixon St/Arrowhead Way -- Industrial Pkwy

QC JOB #: 14937707

CITY/STATE: Alameda, CA

DATE: Wed, Apr 10 2019

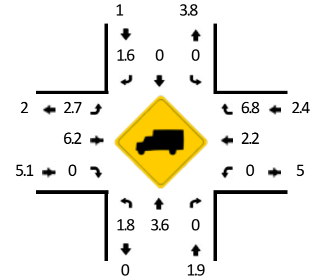


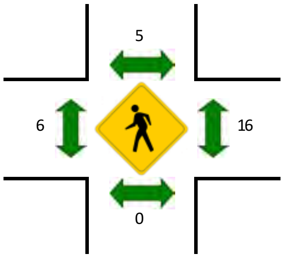
Peak-Hour: 7:25 AM -- 8:25 AM

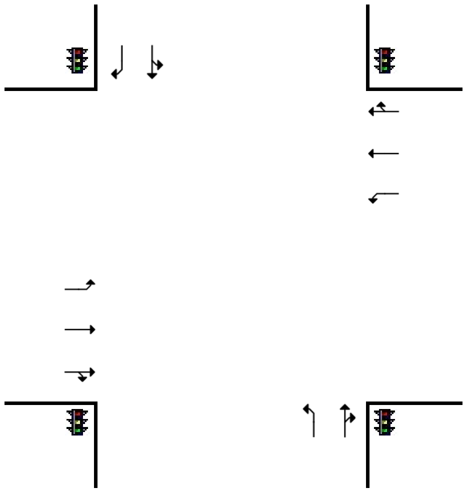
Peak 15-Min: 7:40 AM -- 7:55 AM

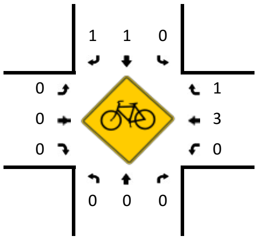
Quality Counts

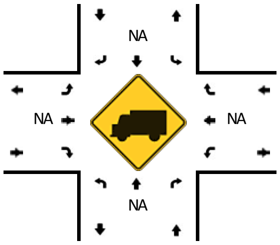
DATA THAT DRIVES COMMUNITIES

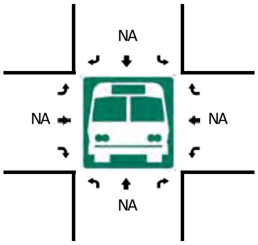












5-Min Count Period Beginning At	Dixon St/Arrowhead Way (Northbound)				Dixon St/Arrowhead Way (Southbound)				Industrial Pkwy (Eastbound)				Industrial Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	6	2	1	0	12	5	16	0	8	15	0	1	0	94	6	1	167	
7:05 AM	11	3	0	0	5	0	17	0	21	39	0	0	0	78	5	0	179	
7:10 AM	7	1	2	0	5	2	11	0	11	41	2	0	0	127	3	0	212	
7:15 AM	11	0	2	0	12	0	21	0	20	31	3	1	0	77	3	0	181	
7:20 AM	11	4	2	0	7	0	13	0	12	31	4	0	1	90	6	1	182	
7:25 AM	8	1	0	0	7	0	12	0	10	36	1	0	1	71	4	1	152	
7:30 AM	8	2	0	0	6	0	13	0	14	34	2	1	0	115	2	0	197	
7:35 AM	14	4	3	0	7	0	21	0	18	35	1	0	1	102	6	0	212	
7:40 AM	8	3	0	0	5	1	21	0	9	70	3	0	0	128	3	1	252	
7:45 AM	8	3	2	0	14	1	22	0	23	54	1	0	0	106	2	1	237	
7:50 AM	13	2	2	0	14	7	26	0	17	47	2	0	1	96	8	2	237	
7:55 AM	16	1	1	0	8	7	29	0	12	51	1	0	0	99	5	0	230	2438
8:00 AM	3	4	1	0	9	3	25	0	11	53	5	0	0	122	8	2	246	2517
8:05 AM	10	2	1	0	14	2	26	0	16	45	5	0	0	104	10	0	235	2573
8:10 AM	9	2	0	0	12	4	26	0	21	52	1	0	1	92	8	0	228	2589
8:15 AM	12	1	3	0	6	0	23	0	20	34	6	0	0	110	7	1	223	2631
8:20 AM	4	3	2	0	4	1	12	0	13	52	6	0	1	105	11	2	216	2665
8:25 AM	11	0	0	0	1	2	15	0	15	39	3	0	0	63	1	0	150	2663
8:30 AM	3	0	0	0	4	1	13	0	10	35	4	0	0	113	1	0	184	2650
8:35 AM	5	2	2	0	5	4	21	0	10	32	5	0	1	90	3	0	180	2618
8:40 AM	7	2	1	0	2	1	15	0	7	36	3	0	0	84	4	0	162	2528
8:45 AM	10	0	0	0	3	1	23	0	9	40	3	0	0	117	1	0	207	2498
8:50 AM	6	1	3	0	4	0	15	0	9	30	1	0	1	95	5	0	170	2431
8:55 AM	11	0	0	0	3	0	17	0	10	31	1	1	2	93	1	0	170	2371

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	116	32	16	0	132	36	276	0	196	684	24	0	4	1320	52	16	2904
Heavy Trucks	4	0	0		0	0	0		4	36	0		0	36	4		84
Pedestrians		0				8				8				12			28
Bicycles	0	0	0		0	1	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 4/18/2019 3:02 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Attachment V

Type of peak hour being reported: Intersection Peak

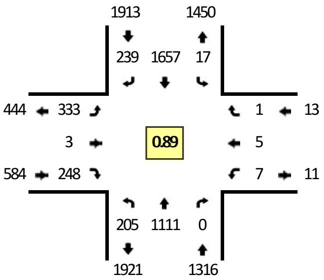
Method for determining peak hour: Total Entering Volume

LOCATION: Mission Blvd -- Tennyson Rd

CITY/STATE: Alameda, CA

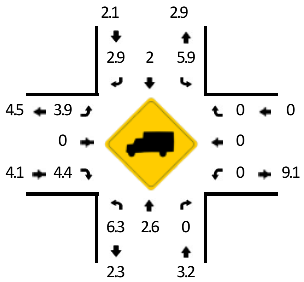
QC JOB #: 14937705

DATE: Wed, Apr 10 2019



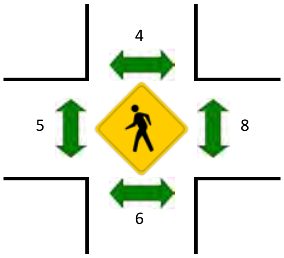
Peak-Hour: 7:15 AM -- 8:15 AM

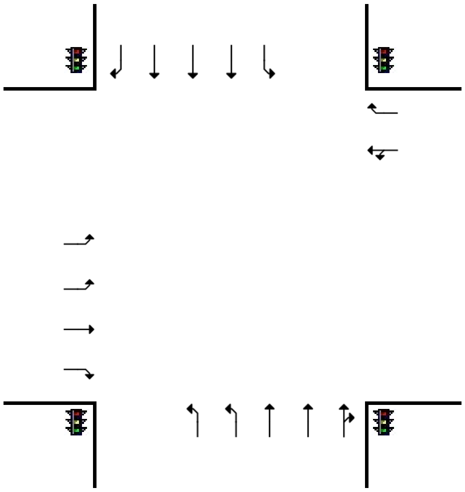
Peak 15-Min: 7:40 AM -- 7:55 AM

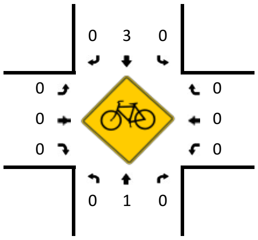


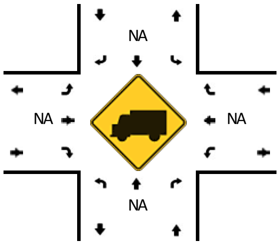
Quality Counts

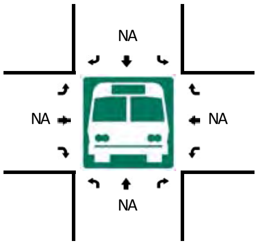
DATA THAT DRIVES COMMUNITIES











5-Min Count Period Beginning At	Mission Blvd (Northbound)				Mission Blvd (Southbound)				Tennyson Rd (Eastbound)				Tennyson Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	10	47	0	1	0	159	14	1	24	0	19	0	0	0	0	0	275	
7:05 AM	6	73	0	1	0	214	26	0	20	1	17	0	0	0	0	0	358	
7:10 AM	18	37	0	0	0	122	16	3	15	0	28	1	0	0	0	0	240	
7:15 AM	11	86	0	1	1	170	8	1	16	0	19	0	1	2	0	0	316	
7:20 AM	16	86	0	0	0	104	11	1	21	0	18	1	0	0	0	0	258	
7:25 AM	12	82	0	0	2	153	15	0	21	0	18	0	0	0	0	0	303	
7:30 AM	12	77	0	1	1	94	12	1	27	0	21	0	1	0	0	0	247	
7:35 AM	8	102	0	0	0	145	11	0	29	0	22	0	0	0	0	0	317	
7:40 AM	14	94	0	0	0	172	19	1	32	0	17	0	2	0	0	0	351	
7:45 AM	14	157	0	0	0	136	28	0	23	1	19	0	0	0	1	0	379	
7:50 AM	18	117	0	0	0	122	17	1	38	1	29	0	1	1	0	0	345	
7:55 AM	25	75	0	1	1	129	24	3	28	0	21	1	1	0	0	0	309	3698
8:00 AM	17	94	0	3	1	172	32	0	25	1	16	1	1	0	0	0	363	3786
8:05 AM	25	78	0	1	1	132	35	0	41	0	29	1	0	1	0	0	344	3772
8:10 AM	24	63	0	2	1	128	27	1	28	0	19	0	0	1	0	0	294	3826
8:15 AM	20	65	0	1	0	132	18	1	28	1	23	2	0	0	0	0	291	3801
8:20 AM	11	53	0	0	1	123	19	3	24	0	17	1	0	1	0	0	253	3796
8:25 AM	18	77	0	1	0	137	14	0	22	0	29	1	1	1	0	0	301	3794
8:30 AM	17	53	0	0	0	120	13	2	21	0	20	1	0	1	0	0	248	3795
8:35 AM	13	71	0	0	0	125	23	0	27	0	19	1	0	0	0	0	279	3757
8:40 AM	10	57	0	0	0	135	14	1	13	0	19	0	0	0	0	0	249	3655
8:45 AM	11	64	0	0	0	125	24	1	16	0	15	0	0	1	0	0	257	3533
8:50 AM	13	43	0	0	0	115	20	1	22	0	11	0	1	1	2	0	229	3417
8:55 AM	8	53	0	0	0	114	23	0	18	0	16	0	1	0	0	0	233	3341

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	184	1472	0	0	0	1720	256	8	372	8	260	0	12	4	4	0	4300
Heavy Trucks	16	28	0		0	32	8		12	0	16		0	0	0		112
Pedestrians		8				8				8				12			36
Bicycles	0	1	0		0	1	0		0	0	0		0	0	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 4/18/2019 3:02 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

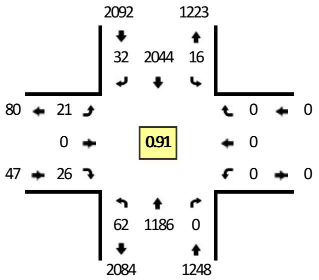
Attachment V

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

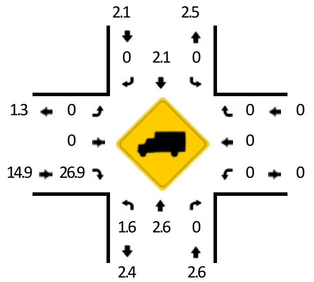
LOCATION: Mission Blvd -- Valle Vista Ave
CITY/STATE: Alameda, CA

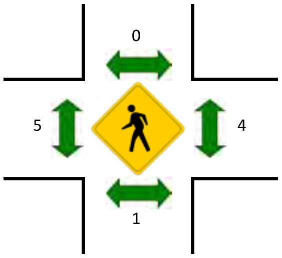
QC JOB #: 14937703
DATE: Wed, Apr 10 2019

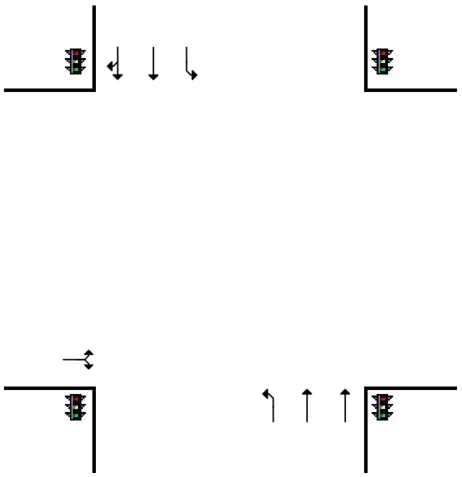


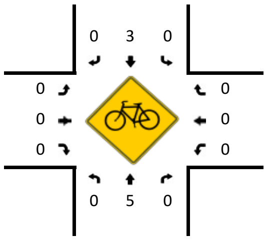
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

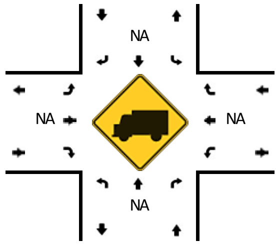
Quality Counts
DATA THAT DRIVES COMMUNITIES

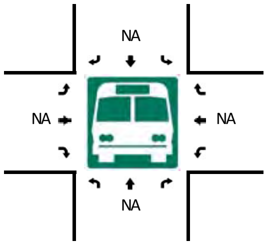












5-Min Count Period Beginning At	Mission Blvd (Northbound)				Mission Blvd (Southbound)				Valle Vista Ave (Eastbound)				Valle Vista Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	1	64	0	2	0	199	2	2	4	0	1	0	0	0	0	0	275	
7:05 AM	1	75	0	1	0	213	2	1	1	0	0	0	0	0	0	0	294	
7:10 AM	0	78	0	0	0	177	1	0	2	0	1	0	0	0	0	0	259	
7:15 AM	3	73	0	1	0	178	3	0	2	0	1	0	0	0	0	0	261	
7:20 AM	10	102	0	2	0	131	1	1	2	0	1	0	0	0	0	0	250	
7:25 AM	3	82	0	1	0	143	3	1	2	0	5	0	0	0	0	0	240	
7:30 AM	2	105	0	1	0	167	2	1	0	0	4	0	0	0	0	0	282	
7:35 AM	7	105	0	3	0	170	2	2	4	0	1	0	0	0	0	0	294	
7:40 AM	5	104	0	1	0	177	3	2	0	0	5	0	0	0	0	0	297	
7:45 AM	3	150	0	1	0	149	4	2	1	0	1	0	0	0	0	0	311	
7:50 AM	7	143	0	1	0	152	5	2	2	0	1	0	0	0	0	0	313	
7:55 AM	6	105	0	0	0	188	4	2	1	0	5	0	0	0	0	0	311	3387
8:00 AM	4	102	0	0	0	162	4	0	2	0	1	0	0	0	0	0	275	3387
8:05 AM	4	99	0	0	0	146	5	0	0	0	2	0	0	0	0	0	256	3349
8:10 AM	6	88	0	0	0	149	3	2	0	0	3	0	0	0	0	0	251	3341
8:15 AM	3	75	0	2	0	121	2	2	1	0	4	0	0	0	0	0	210	3290
8:20 AM	2	74	0	0	0	156	1	4	3	0	1	0	0	0	0	0	241	3281
8:25 AM	1	84	0	1	0	152	3	0	0	0	0	0	0	0	0	0	241	3282
8:30 AM	2	70	0	0	0	155	2	1	1	0	1	0	0	0	0	0	232	3232
8:35 AM	1	77	0	1	0	136	3	0	0	0	1	0	0	0	0	0	219	3157
8:40 AM	4	63	0	1	0	139	2	0	2	0	0	0	0	0	0	0	211	3071
8:45 AM	1	71	0	1	0	157	0	3	0	0	0	0	0	0	0	0	233	2993
8:50 AM	1	60	0	1	0	106	0	2	1	0	2	0	0	0	0	0	173	2853
8:55 AM	1	65	0	1	0	147	1	0	2	0	2	0	0	0	0	0	219	2761

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	64	1592	0	8	0	1956	52	24	16	0	28	0	0	0	0	0	3740
Heavy Trucks	0	36	0		0	32	0		0	0	8		0	0	0		76
Pedestrians		0				0				12				0			12
Bicycles	0	2	0		0	1	0		0	0	0		0	0	0		3
Railroad																	
Stopped Buses																	

Comments:

Report generated on 4/18/2019 3:02 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Attachment V

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Mission Blvd -- Fairway St

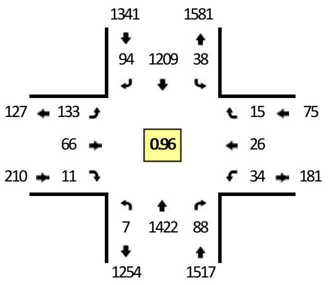
CITY/STATE: Hayward, CA

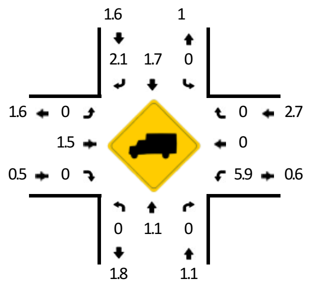
QC JOB #: 14937722

DATE: Wed, Apr 10 2019

Peak-Hour: 4:50 PM -- 5:50 PM

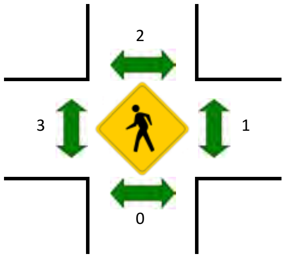
Peak 15-Min: 5:15 PM -- 5:30 PM

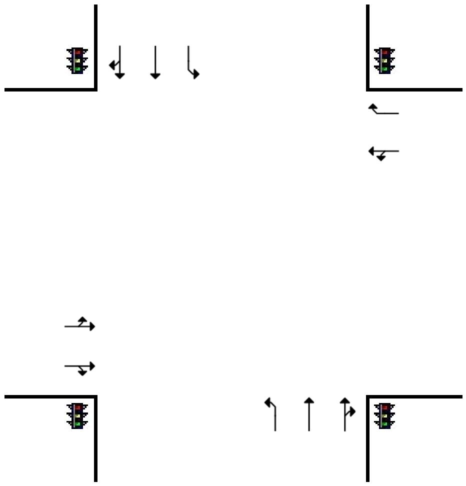


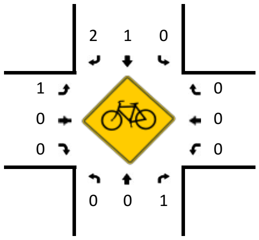


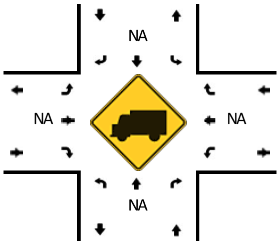
Quality Counts

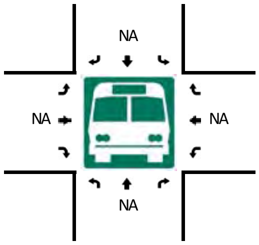
DATA THAT DRIVES COMMUNITIES











5-Min Count Period Beginning At	Mission Blvd (Northbound)				Mission Blvd (Southbound)				Fairway St (Eastbound)				Fairway St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	72	4	2	5	71	11	0	16	9	1	0	5	4	3	0	203	
4:05 PM	0	101	7	0	3	77	7	1	15	2	1	0	3	3	0	0	220	
4:10 PM	0	111	9	0	3	98	7	1	12	9	0	0	2	0	1	0	253	
4:15 PM	0	141	8	0	2	96	9	0	9	4	0	0	3	3	1	0	276	
4:20 PM	1	125	4	1	6	74	6	1	14	7	0	0	6	2	1	0	248	
4:25 PM	1	124	6	0	3	84	5	1	7	3	0	0	2	1	0	0	237	
4:30 PM	1	111	5	1	3	100	5	1	16	6	1	0	4	3	0	0	257	
4:35 PM	0	111	7	0	5	75	15	0	2	4	0	0	3	0	1	0	223	
4:40 PM	0	116	5	0	1	91	8	0	7	3	1	0	4	0	0	0	236	
4:45 PM	0	132	8	0	3	112	10	1	13	3	0	0	2	0	1	0	285	
4:50 PM	1	132	5	0	1	118	7	0	6	3	1	0	4	4	0	0	282	
4:55 PM	0	123	13	0	2	84	8	2	16	7	2	0	1	4	1	0	263	2983
5:00 PM	0	99	3	0	3	85	5	2	17	8	0	0	2	2	3	0	229	3009
5:05 PM	0	106	10	0	3	98	5	1	15	5	2	0	2	3	0	0	250	3039
5:10 PM	0	124	5	0	3	100	9	0	7	6	0	0	1	5	0	0	260	3046
5:15 PM	3	132	9	0	1	110	4	1	12	2	1	0	1	1	1	0	278	3048
5:20 PM	1	125	9	0	6	94	6	1	10	8	1	0	3	0	1	0	265	3065
5:25 PM	0	113	7	0	3	112	6	1	10	7	3	0	8	1	4	0	275	3103
5:30 PM	0	116	3	0	2	117	12	1	9	5	0	0	2	4	3	0	274	3120
5:35 PM	1	101	7	0	0	81	10	1	14	8	0	0	1	1	1	0	226	3123
5:40 PM	0	123	9	0	2	81	8	0	8	2	1	0	5	1	0	0	240	3127
5:45 PM	1	128	8	0	1	129	14	1	9	5	0	0	4	0	1	0	301	3143
5:50 PM	1	123	9	0	3	85	12	0	11	5	1	0	4	0	0	0	254	3115
5:55 PM	0	122	6	0	3	69	10	2	6	5	2	0	2	2	1	0	230	3082

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	16	1480	100	0	40	1264	64	12	128	68	20	0	48	8	24	0	3272
Heavy Trucks	0	16	0		0	16	0		0	0	0		0	0	0		32
Pedestrians		0				4				0				0			4
Bicycles	0	0	1		0	0	1		0	0	0		0	0	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 4/18/2019 3:03 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Attachment V

Type of peak hour being reported: Intersection Peak

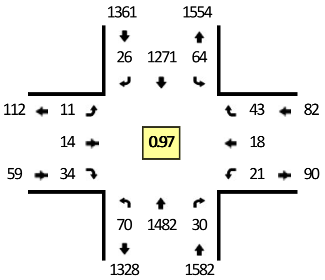
Method for determining peak hour: Total Entering Volume

LOCATION: Mission Blvd -- Arrowhead Way

QC JOB #: 14937716

CITY/STATE: Alameda, CA

DATE: Wed, Apr 10 2019

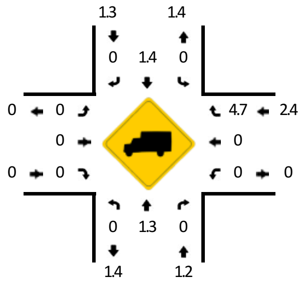


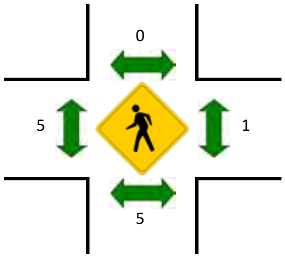
Peak-Hour: 4:55 PM -- 5:55 PM

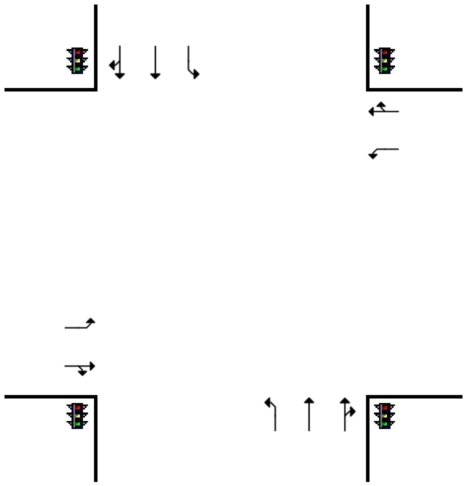
Peak 15-Min: 5:25 PM -- 5:40 PM

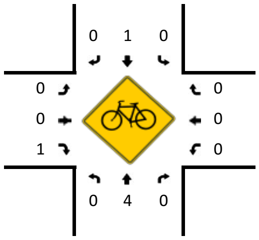
Quality Counts

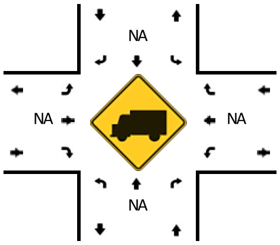
DATA THAT DRIVES COMMUNITIES

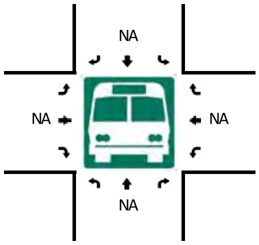












5-Min Count Period Beginning At	Mission Blvd (Northbound)				Mission Blvd (Southbound)				Arrowhead Way (Eastbound)				Arrowhead Way (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	2	106	2	0	4	83	1	0	0	0	3	0	2	0	7	0	210	
4:05 PM	2	123	5	0	3	108	0	1	2	0	2	0	3	1	5	0	255	
4:10 PM	5	117	6	0	5	76	1	4	1	0	2	0	2	3	4	0	226	
4:15 PM	1	127	3	1	5	103	0	1	3	1	1	0	3	3	2	0	254	
4:20 PM	3	118	5	0	7	89	5	2	0	0	2	0	0	1	4	0	236	
4:25 PM	6	109	4	2	1	93	0	4	1	3	4	0	1	3	7	0	238	
4:30 PM	6	113	3	1	2	114	3	3	1	0	1	0	4	2	3	0	256	
4:35 PM	3	147	2	0	4	96	1	4	0	1	2	0	0	1	3	0	264	
4:40 PM	4	109	4	0	4	100	1	4	1	1	1	0	0	2	6	0	237	
4:45 PM	7	126	1	0	7	110	1	1	0	0	2	0	3	0	7	0	265	
4:50 PM	3	116	2	0	0	111	2	1	1	3	4	0	1	0	1	0	245	
4:55 PM	1	142	2	0	4	89	0	0	1	1	3	0	1	1	3	0	248	2934
5:00 PM	11	112	1	1	7	104	4	1	0	0	1	0	1	0	3	0	246	2970
5:05 PM	4	124	5	0	4	114	4	0	2	0	1	0	4	2	4	0	268	2983
5:10 PM	6	129	6	0	0	99	3	1	0	2	1	0	1	0	3	0	251	3008
5:15 PM	7	119	1	0	3	122	1	3	0	2	1	0	1	0	4	0	264	3018
5:20 PM	6	126	5	0	5	102	0	2	0	3	4	0	3	0	3	0	259	3041
5:25 PM	2	106	1	0	4	111	1	0	0	1	5	0	2	2	6	0	241	3044
5:30 PM	4	145	3	0	5	115	0	2	0	3	2	0	3	4	4	0	290	3078
5:35 PM	5	128	2	0	3	107	3	2	2	0	4	0	0	4	3	0	263	3077
5:40 PM	8	109	3	0	8	84	1	3	1	2	5	0	1	0	3	0	228	3068
5:45 PM	3	113	1	1	0	117	5	2	4	0	4	0	1	3	4	0	258	3061
5:50 PM	11	129	0	0	3	107	4	2	1	0	3	0	3	2	3	0	268	3084
5:55 PM	1	127	0	0	1	93	1	2	0	0	5	0	1	2	1	0	234	3070

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	44	1516	24	0	48	1332	16	16	8	16	44	0	20	40	52	0	3176
Heavy Trucks	0	20	0		0	8	0		0	0	0		0	0	4		32
Pedestrians		0				0				4				0			4
Bicycles	0	1	0		0	1	0		0	0	0		0	0	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 4/18/2019 3:03 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Attachment V

Type of peak hour being reported: Intersection Peak

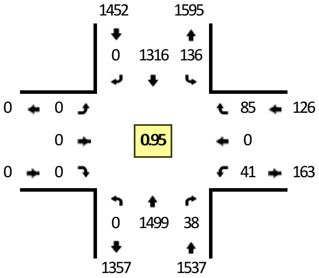
Method for determining peak hour: Total Entering Volume

LOCATION: Mission Blvd -- Garin Ave

CITY/STATE: Alameda, CA

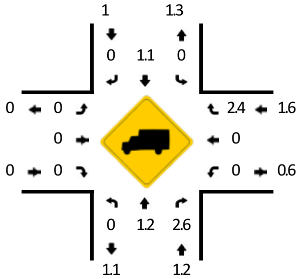
QC JOB #: 14937714

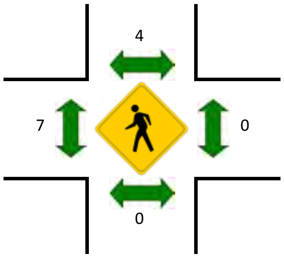
DATE: Wed, Apr 10 2019

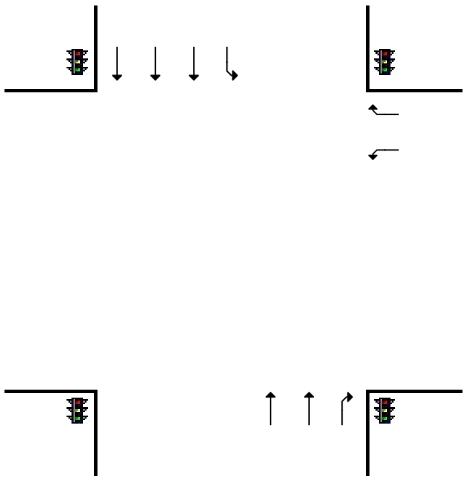


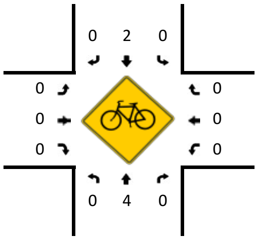
Peak-Hour: 5:00 PM -- 6:00 PM

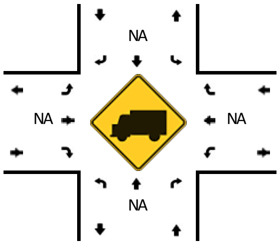
Peak 15-Min: 5:25 PM -- 5:40 PM

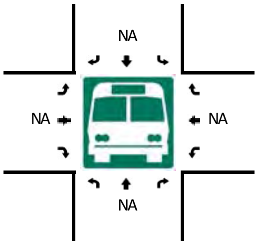












5-Min Count Period Beginning At	Mission Blvd (Northbound)				Mission Blvd (Southbound)				Garin Ave (Eastbound)				Garin Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	114	4	0	14	82	0	1	0	0	0	0	5	0	6	0	226	
4:05 PM	0	97	1	0	7	98	0	0	0	0	0	0	2	0	6	0	211	
4:10 PM	0	130	5	0	9	88	0	0	0	0	0	0	5	0	6	0	243	
4:15 PM	0	115	4	0	7	105	0	1	0	0	0	0	3	0	3	0	238	
4:20 PM	0	144	4	0	6	96	0	2	0	0	0	0	2	0	6	0	260	
4:25 PM	0	106	3	0	9	102	0	1	0	0	0	0	4	0	8	0	233	
4:30 PM	0	126	2	0	7	117	0	0	0	0	0	0	1	0	6	0	259	
4:35 PM	0	120	3	0	10	95	0	1	0	0	0	0	4	0	6	0	239	
4:40 PM	0	136	7	0	7	119	0	2	0	0	0	0	4	0	5	0	280	
4:45 PM	0	122	4	0	5	119	0	0	0	0	0	0	6	0	4	0	260	
4:50 PM	0	115	2	0	12	90	0	1	0	0	0	0	0	0	10	0	230	
4:55 PM	0	130	1	0	7	107	0	0	0	0	0	0	2	0	1	0	248	2927
5:00 PM	0	139	4	0	11	100	0	2	0	0	0	0	3	0	12	0	271	2972
5:05 PM	0	107	4	0	9	118	0	1	0	0	0	0	7	0	5	0	251	3012
5:10 PM	0	106	3	0	12	96	0	0	0	0	0	0	2	0	9	0	228	2997
5:15 PM	0	146	1	0	2	125	0	1	0	0	0	0	3	0	6	0	284	3043
5:20 PM	0	110	4	0	16	109	0	1	0	0	0	0	0	0	4	0	244	3027
5:25 PM	0	141	2	0	12	110	0	0	0	0	0	0	3	0	3	0	271	3065
5:30 PM	0	131	4	0	11	123	0	1	0	0	0	0	2	0	7	0	279	3085
5:35 PM	0	136	4	0	10	109	0	3	0	0	0	0	2	0	4	0	268	3114
5:40 PM	0	106	3	0	13	97	0	1	0	0	0	0	4	0	14	0	238	3072
5:45 PM	0	123	1	0	12	112	0	0	0	0	0	0	5	0	4	0	257	3069
5:50 PM	0	134	5	0	10	109	0	1	0	0	0	0	6	0	8	0	273	3112
5:55 PM	0	120	3	0	7	108	0	0	0	0	0	0	4	0	9	0	251	3115

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1632	40	0	132	1368	0	16	0	0	0	0	28	0	56	0	3272
Heavy Trucks	0	16	0		0	4	0		0	0	0		0	0	0		20
Pedestrians		0				0				4				0			4
Bicycles	0	1	0		0	1	0		0	0	0		0	0	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 4/18/2019 3:02 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

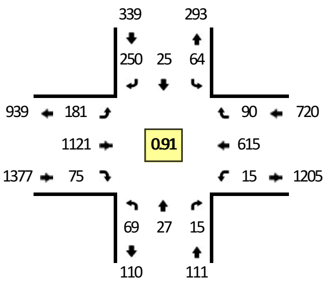
Attachment V

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

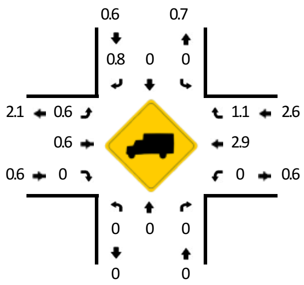
LOCATION: Dixon St/Arrowhead Way -- Industrial Pkwy
CITY/STATE: Alameda, CA

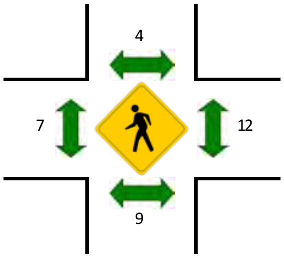
QC JOB #: 14937708
DATE: Wed, Apr 10 2019

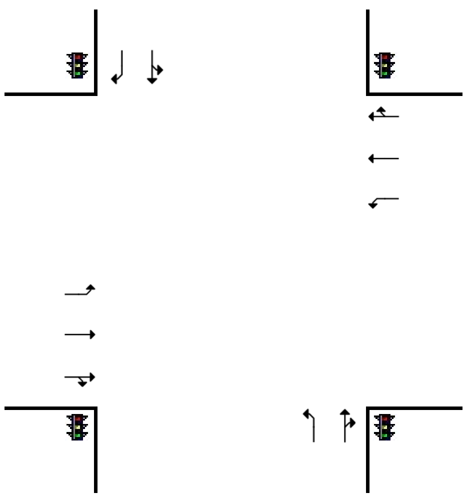


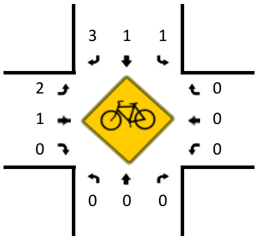
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

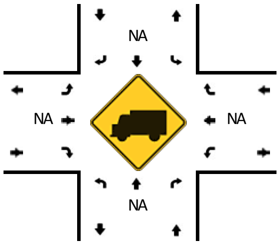
Quality Counts
DATA THAT DRIVES COMMUNITIES

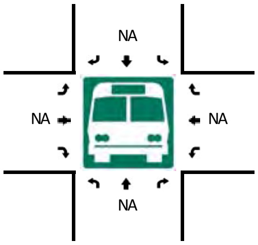












5-Min Count Period Beginning At	Dixon St/Arrowhead Way (Northbound)				Dixon St/Arrowhead Way (Southbound)				Industrial Pkwy (Eastbound)				Industrial Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	2	2	0	0	3	3	10	0	11	121	4	0	0	45	4	0	205	
4:05 PM	2	0	1	0	2	1	8	0	17	84	4	0	1	58	7	2	187	
4:10 PM	2	0	1	0	6	0	9	0	11	90	12	1	3	53	7	0	195	
4:15 PM	4	2	1	0	6	0	14	0	12	86	8	0	1	45	8	1	188	
4:20 PM	5	2	1	0	3	2	10	0	15	81	6	0	1	57	6	0	189	
4:25 PM	5	4	0	0	1	0	14	0	15	78	7	0	2	42	6	0	174	
4:30 PM	7	3	0	0	9	0	15	0	17	102	6	0	1	50	6	0	216	
4:35 PM	0	0	0	0	5	0	21	0	23	119	8	1	0	45	5	0	227	
4:40 PM	3	4	2	0	3	3	16	0	10	100	5	0	4	36	12	1	199	
4:45 PM	3	1	1	0	6	1	19	0	14	78	6	1	0	40	9	0	179	
4:50 PM	4	3	1	0	7	0	12	0	18	91	8	1	1	59	10	1	216	
4:55 PM	4	2	1	0	3	1	5	0	14	96	7	0	0	54	9	0	196	2371
5:00 PM	4	2	0	0	8	2	25	0	15	82	4	0	0	42	9	0	193	2359
5:05 PM	8	4	1	0	9	4	38	0	10	97	6	1	1	48	4	0	231	2403
5:10 PM	3	2	0	0	5	2	14	0	14	82	5	1	1	36	4	2	171	2379
5:15 PM	6	3	4	0	2	2	18	0	21	112	4	0	0	74	6	0	252	2443
5:20 PM	5	2	1	0	3	1	17	0	19	96	8	1	0	41	6	0	200	2454
5:25 PM	7	4	0	0	3	1	22	0	18	120	11	0	1	51	11	0	249	2529
5:30 PM	5	0	3	0	4	3	24	0	12	82	9	0	3	41	10	0	196	2509
5:35 PM	7	2	2	0	8	2	28	0	14	86	4	1	0	55	13	1	223	2505
5:40 PM	4	5	0	0	3	1	18	0	11	78	4	1	1	68	4	1	199	2505
5:45 PM	11	2	0	0	10	3	12	0	17	94	4	0	0	57	8	1	219	2545
5:50 PM	4	0	3	0	6	2	26	0	9	85	6	0	3	50	7	0	201	2530
5:55 PM	5	1	1	0	3	2	8	0	16	107	10	0	0	52	8	0	213	2547

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	72	36	20	0	32	16	228	0	232	1312	92	4	4	664	92	0	2804
Heavy Trucks	0	0	0		0	0	0		0	8	0		0	12	0		20
Pedestrians		16				8				16				8			48
Bicycles	0	0	0		0	0	0		2	0	0		0	0	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 4/18/2019 3:02 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Attachment V

Type of peak hour being reported: Intersection Peak

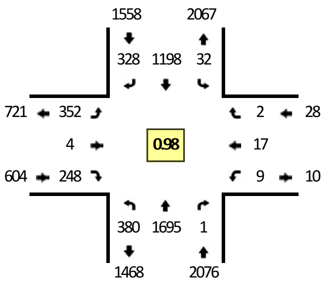
Method for determining peak hour: Total Entering Volume

LOCATION: Mission Blvd -- Tennyson Rd

CITY/STATE: Alameda, CA

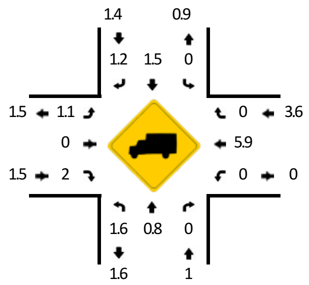
QC JOB #: 14937706

DATE: Wed, Apr 10 2019



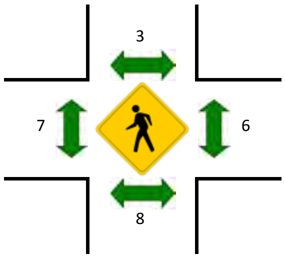
Peak-Hour: 4:50 PM -- 5:50 PM

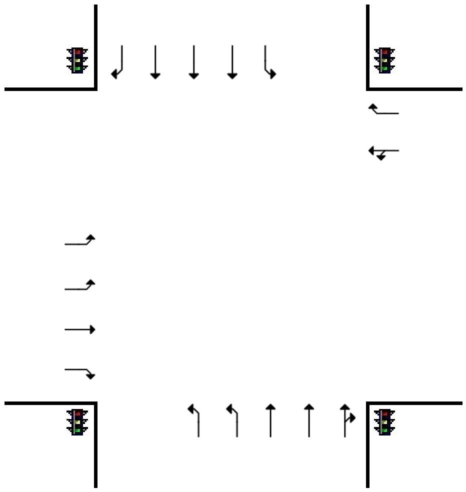
Peak 15-Min: 5:20 PM -- 5:35 PM

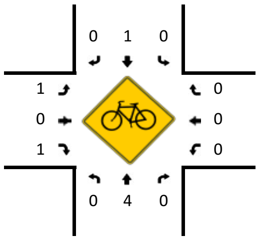


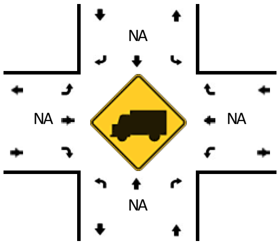
Quality Counts

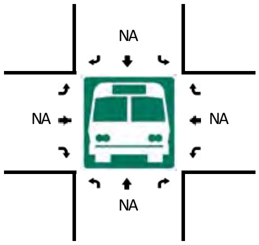
DATA THAT DRIVES COMMUNITIES











5-Min Count Period Beginning At	Mission Blvd (Northbound)				Mission Blvd (Southbound)				Tennyson Rd (Eastbound)				Tennyson Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	31	135	0	3	0	92	30	0	26	0	14	0	1	2	0	0	334	
4:05 PM	31	132	0	1	0	80	13	2	27	0	15	0	0	0	3	0	304	
4:10 PM	14	120	0	0	0	85	17	0	32	1	20	0	0	0	0	0	289	
4:15 PM	35	136	1	1	0	100	24	3	27	0	19	2	0	0	0	0	348	
4:20 PM	25	154	0	1	3	84	33	2	40	0	26	0	0	1	0	0	369	
4:25 PM	24	124	0	0	1	100	31	2	15	0	11	1	1	2	2	0	314	
4:30 PM	20	142	0	3	1	84	25	1	26	2	32	0	1	0	1	0	338	
4:35 PM	19	152	0	1	0	74	16	2	41	1	12	2	0	3	2	0	325	
4:40 PM	23	148	0	1	0	113	22	2	25	0	19	1	0	0	1	0	355	
4:45 PM	27	159	0	1	1	74	21	2	27	1	18	1	1	1	0	0	334	
4:50 PM	42	129	0	0	0	100	25	2	34	1	12	0	1	2	0	0	348	
4:55 PM	28	146	0	1	0	107	27	2	32	0	27	3	1	5	0	0	379	4037
5:00 PM	28	143	0	1	0	97	33	4	23	0	12	0	0	1	1	0	343	4046
5:05 PM	31	137	0	2	2	78	27	1	38	0	26	3	0	1	0	0	346	4088
5:10 PM	33	145	1	1	0	108	30	1	21	0	24	1	1	2	0	0	368	4167
5:15 PM	26	136	0	0	0	103	29	2	36	0	28	2	0	0	0	0	362	4181
5:20 PM	29	153	0	1	1	99	21	3	20	0	22	0	0	1	0	0	350	4162
5:25 PM	33	134	0	0	0	111	31	1	29	0	19	0	0	0	0	0	358	4206
5:30 PM	33	157	0	2	2	86	29	2	34	0	28	0	0	2	0	0	375	4243
5:35 PM	25	145	0	0	0	97	23	2	25	1	20	0	0	1	0	0	339	4257
5:40 PM	34	137	0	2	0	96	23	2	16	0	13	0	3	1	0	0	327	4229
5:45 PM	25	133	0	3	0	116	30	5	35	2	17	0	3	1	1	0	371	4266
5:50 PM	28	145	0	2	0	81	26	0	28	0	18	2	0	1	1	0	332	4250
5:55 PM	25	143	0	0	0	100	22	4	10	0	21	0	4	1	0	0	330	4201

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	380	1776	0	12	12	1184	324	24	332	0	276	0	0	12	0	0	4332
Heavy Trucks	4	12	0		0	24	8		4	0	4		0	0	0		56
Pedestrians		8				0				0				8			16
Bicycles	0	4	0		0	1	0		0	0	0		0	0	0		5
Railroad																	
Stopped Buses																	

Comments:

Report generated on 4/18/2019 3:02 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Attachment V

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Mission Blvd -- Valle Vista Ave

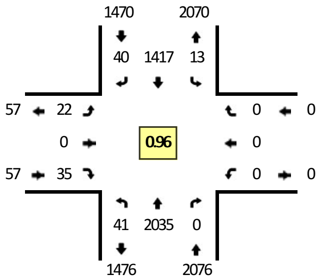
CITY/STATE: Alameda, CA

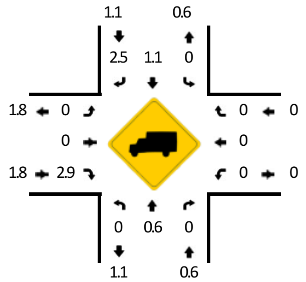
QC JOB #: 14937704

DATE: Wed, Apr 10 2019

Peak-Hour: 4:50 PM -- 5:50 PM

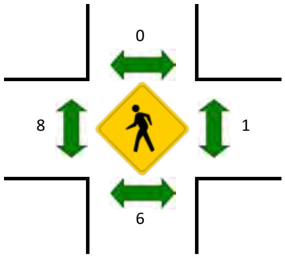
Peak 15-Min: 5:10 PM -- 5:25 PM

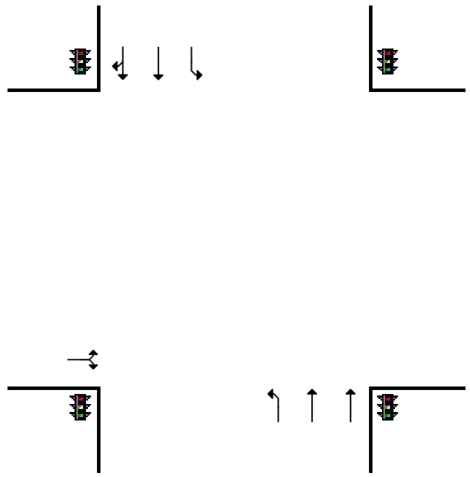


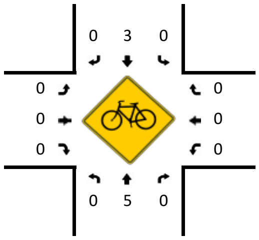


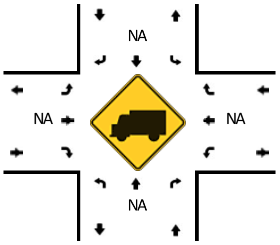
Quality Counts

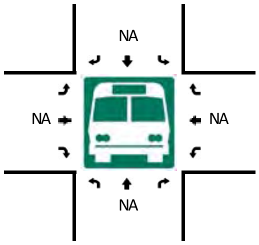
DATA THAT DRIVES COMMUNITIES











5-Min Count Period Beginning At	Mission Blvd (Northbound)				Mission Blvd (Southbound)				Valle Vista Ave (Eastbound)				Valle Vista Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	3	152	0	4	0	86	3	3	4	0	3	0	0	0	0	0	258	
4:05 PM	4	151	0	4	0	98	4	1	3	0	1	0	0	0	0	0	266	
4:10 PM	1	155	0	2	0	116	4	1	2	0	1	0	0	0	0	0	282	
4:15 PM	0	171	0	3	0	114	2	0	0	0	0	0	0	0	0	0	290	
4:20 PM	0	162	0	0	0	101	2	1	0	0	1	0	0	0	0	0	267	
4:25 PM	4	139	0	2	0	104	7	3	2	0	2	0	0	0	0	0	263	
4:30 PM	1	169	0	2	0	118	7	2	3	0	2	0	0	0	0	0	304	
4:35 PM	3	170	0	7	0	80	2	3	1	0	2	0	0	0	0	0	268	
4:40 PM	2	179	0	1	0	129	4	2	2	0	2	0	0	0	0	0	321	
4:45 PM	0	177	0	2	0	91	3	1	2	0	2	0	0	0	0	0	278	
4:50 PM	0	171	0	1	0	115	3	0	1	0	5	0	0	0	0	0	296	
4:55 PM	3	164	0	3	0	113	6	0	0	0	0	0	0	0	0	0	289	3382
5:00 PM	2	165	0	4	0	118	2	4	3	0	5	0	0	0	0	0	303	3427
5:05 PM	1	168	0	1	0	99	1	0	0	0	1	0	0	0	0	0	271	3432
5:10 PM	1	174	0	3	0	130	3	0	2	0	1	0	0	0	0	0	314	3464
5:15 PM	1	164	0	1	0	120	4	2	2	0	3	0	0	0	0	0	297	3471
5:20 PM	2	185	0	0	0	129	4	2	2	0	2	0	0	0	0	0	326	3530
5:25 PM	2	166	0	3	0	117	3	0	1	0	4	0	0	0	0	0	296	3563
5:30 PM	2	183	0	0	0	111	3	1	3	0	0	0	0	0	0	0	303	3562
5:35 PM	0	169	0	5	0	116	2	0	2	0	4	0	0	0	0	0	298	3592
5:40 PM	3	162	0	2	0	116	4	2	3	0	4	0	0	0	0	0	296	3567
5:45 PM	0	164	0	1	0	133	5	2	3	0	6	0	0	0	0	0	314	3603
5:50 PM	3	174	0	2	0	101	2	2	1	0	3	0	0	0	0	0	288	3595
5:55 PM	1	156	0	3	0	119	4	0	0	0	6	0	0	0	0	0	289	3595

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	16	2092	0	16	0	1516	44	16	24	0	24	0	0	0	0	0	3748
Heavy Trucks	0	12	0		0	8	0		0	0	0		0	0	0		20
Pedestrians		8				0				8				4			20
Bicycles	0	4	0		0	0	0		0	0	0		0	0	0		4
Railroad																	
Stopped Buses																	

Comments:

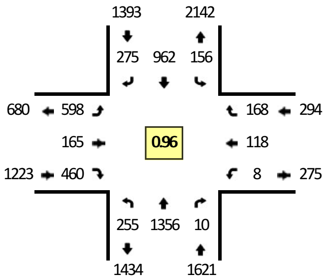
Report generated on 4/18/2019 3:02 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Attachment V

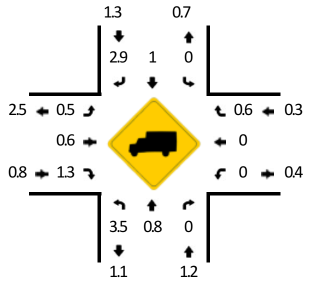
Type of peak hour being reported: Intersection Peak
Method for determining peak hour: Total Entering Volume

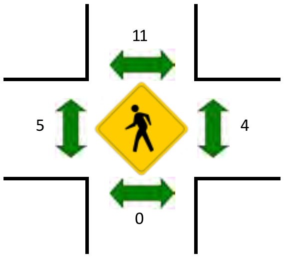
LOCATION: Mission Blvd -- Industrial Pkwy/Alquire Pkwy
CITY/STATE: Alameda, CA
QC JOB #: 14937702
DATE: Wed, Apr 10 2019

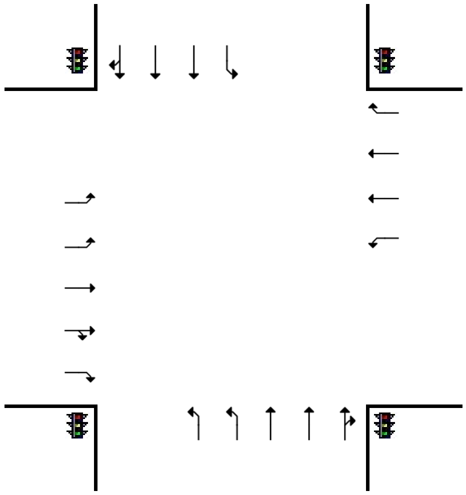


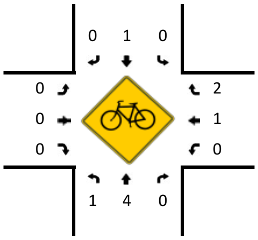
Peak-Hour: 4:40 PM -- 5:40 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

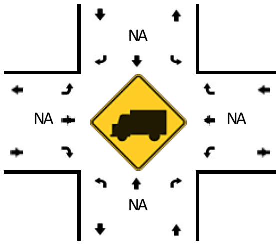
Quality Counts
DATA THAT DRIVES COMMUNITIES

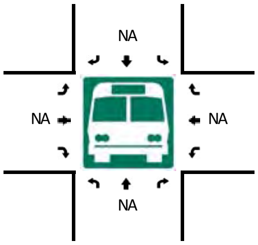












5-Min Count Period Beginning At	Mission Blvd (Northbound)				Mission Blvd (Southbound)				Industrial Pkwy/Alquire Pkwy (Eastbound)				Industrial Pkwy/Alquire Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	22	97	0	0	11	54	13	0	47	20	40	1	0	7	11	0	323	
4:05 PM	32	89	1	1	9	77	26	0	48	11	24	6	2	7	9	0	342	
4:10 PM	28	100	0	0	7	55	26	6	46	17	41	4	0	13	15	0	358	
4:15 PM	18	113	2	1	8	80	22	2	41	8	32	4	0	9	16	0	356	
4:20 PM	20	110	1	1	7	74	33	3	38	12	33	5	1	6	6	0	350	
4:25 PM	21	91	3	0	6	75	22	2	39	9	32	4	0	7	11	0	322	
4:30 PM	26	112	2	0	8	84	23	2	55	16	43	3	0	2	21	0	397	
4:35 PM	20	106	1	0	4	63	20	3	47	21	42	2	1	7	17	0	354	
4:40 PM	22	117	0	0	9	75	21	5	60	10	38	4	1	6	10	0	378	
4:45 PM	21	112	1	1	7	84	18	18	43	13	39	3	1	7	15	0	383	
4:50 PM	18	129	0	1	7	62	31	4	28	11	41	8	0	13	16	0	369	
4:55 PM	18	106	1	0	10	74	30	4	42	14	38	2	0	8	12	0	359	4291
5:00 PM	21	114	1	0	3	86	25	4	47	17	24	3	0	8	12	0	365	4333
5:05 PM	15	105	1	1	8	84	20	2	58	14	35	0	2	9	12	0	366	4357
5:10 PM	22	102	2	0	10	74	16	4	47	14	34	0	0	8	20	0	353	4352
5:15 PM	28	106	1	0	11	87	31	3	47	8	39	4	4	18	11	0	398	4394
5:20 PM	18	124	0	0	10	78	18	3	48	19	50	3	0	8	12	0	391	4435
5:25 PM	24	108	1	0	8	84	24	3	51	19	41	3	0	9	17	0	392	4505
5:30 PM	13	114	0	0	9	89	21	5	42	13	41	3	0	12	15	0	377	4485
5:35 PM	31	119	2	1	8	85	20	1	49	13	40	3	0	12	16	0	400	4531
5:40 PM	24	100	0	0	7	82	34	3	41	9	25	3	0	13	13	0	354	4507
5:45 PM	20	118	2	0	13	81	32	1	34	17	42	2	0	13	19	0	394	4518
5:50 PM	18	114	1	0	8	76	26	2	41	15	44	3	0	10	16	0	374	4523
5:55 PM	31	105	1	0	2	71	19	2	37	17	45	6	0	8	13	0	357	4521

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	280	1352	8	0	116	996	292	36	584	184	520	40	16	140	160	0	4724
Heavy Trucks	4	12	0		0	4	4		0	0	8		0	0	4		36
Pedestrians		0				8				8				4			20
Bicycles	0	2	0		0	0	0		0	0	0		0	0	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 4/18/2019 3:02 PM
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

APPENDIX B: EXISTING LEVEL OF SERVICE WORKSHEETS

Attachment V

HCM Signalized Intersection Capacity Analysis
1: Mission Boulevard & Tennyson Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑	↱		↰	↱	↰↰	↑↑↱		↰	↑↑↑	↱
Traffic Volume (vph)	329	3	248	7	5	1	196	1287	0	8	1657	239
Future Volume (vph)	329	3	248	7	5	1	196	1287	0	8	1657	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0	4.0	4.0	5.0		4.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00		1.00	1.00	0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583		1807	1583	3433	5085		1770	5085	1583
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583		1807	1583	3433	5085		1770	5085	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	358	3	270	8	5	1	213	1399	0	9	1801	260
RTOR Reduction (vph)	0	0	223	0	0	1	0	0	0	0	0	72
Lane Group Flow (vph)	358	3	47	0	13	0	213	1399	0	9	1801	188
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	3	3		4	4		1	6		5	2	
Permitted Phases			3			4						2
Actuated Green, G (s)	17.0	17.0	17.0		5.8	5.8	7.3	56.3		0.8	49.8	49.8
Effective Green, g (s)	17.0	17.0	17.0		5.8	5.8	7.3	56.3		0.8	49.8	49.8
Actuated g/C Ratio	0.17	0.17	0.17		0.06	0.06	0.07	0.58		0.01	0.51	0.51
Clearance Time (s)	5.0	5.0	5.0		4.0	4.0	4.0	5.0		4.0	5.0	5.0
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)	596	323	274		107	93	255	2924		14	2586	805
v/s Ratio Prot	c0.10	0.00			c0.01		c0.06	0.28		0.01	c0.35	
v/s Ratio Perm			0.03			0.00						0.12
v/c Ratio	0.60	0.01	0.17		0.12	0.00	0.84	0.48		0.64	0.70	0.23
Uniform Delay, d1	37.3	33.5	34.4		43.6	43.3	44.7	12.2		48.4	18.3	13.4
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	1.7	0.0	0.3		0.5	0.0	20.4	0.1		71.2	0.8	0.2
Delay (s)	39.0	33.5	34.7		44.1	43.3	65.1	12.3		119.6	19.1	13.6
Level of Service	D	C	C		D	D	E	B		F	B	B
Approach Delay (s)		37.2			44.1			19.3			18.9	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	97.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Mission Boulevard & Valle Vista

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣		↰	↑↱		↰	↑↱	
Traffic Volume (vph)	16	0	30	0	0	0	60	1374	0	15	1912	39
Future Volume (vph)	16	0	30	0	0	0	60	1374	0	15	1912	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	5.0		4.0	5.0	
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	
Frt		0.91					1.00	1.00		1.00	1.00	
Flt Protected		0.98					0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1668					1770	3539		1770	3529	
Flt Permitted		0.90					0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1524					1770	3539		1770	3529	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	0	33	0	0	0	65	1493	0	16	2078	42
RTOR Reduction (vph)	0	46	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	4	0	0	0	0	65	1493	0	16	2119	0
Turn Type	Perm	NA					Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		8.0					7.2	67.8		1.2	61.8	
Effective Green, g (s)		8.0					7.2	67.8		1.2	61.8	
Actuated g/C Ratio		0.09					0.08	0.75		0.01	0.69	
Clearance Time (s)		4.0					4.0	5.0		4.0	5.0	
Vehicle Extension (s)		3.0					3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		135					141	2666		23	2423	
v/s Ratio Prot							0.04	c0.42		0.01	c0.60	
v/s Ratio Perm		c0.00										
v/c Ratio		0.03					0.46	0.56		0.70	0.87	
Uniform Delay, d1		37.5					39.5	4.7		44.2	11.1	
Progression Factor		1.00					0.84	0.59		1.00	1.00	
Incremental Delay, d2		0.1					2.2	0.8		63.9	4.8	
Delay (s)		37.6					35.4	3.6		108.1	15.8	
Level of Service		D					D	A		F	B	
Approach Delay (s)		37.6			0.0			4.9			16.5	
Approach LOS		D			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Mission Boulevard & Industrial Pkwy

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↱	↱	↰	↑↑	↱	↰↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	254	133	291	22	257	288	310	1022	14	87	1173	657
Future Volume (vph)	254	133	291	22	257	288	310	1022	14	87	1173	657
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	5.0		4.0	5.0	
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.97	0.91		1.00	0.91	
Frt	1.00	0.92	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3125	1441	1770	3539	1583	3433	5075		1770	4811	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3125	1441	1770	3539	1583	3433	5075		1770	4811	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	276	145	316	24	279	313	337	1111	15	95	1275	714
RTOR Reduction (vph)	0	118	118	0	0	220	0	1	0	0	102	0
Lane Group Flow (vph)	276	185	40	24	279	93	337	1125	0	95	1887	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	8.0	23.0	23.0	2.0	17.0	17.0	9.8	39.9		8.1	38.2	
Effective Green, g (s)	8.0	23.0	23.0	2.0	17.0	17.0	9.8	39.9		8.1	38.2	
Actuated g/C Ratio	0.09	0.26	0.26	0.02	0.19	0.19	0.11	0.44		0.09	0.42	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0		4.0	5.0	
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)	305	798	368	39	668	299	373	2249		159	2042	
v/s Ratio Prot	c0.08	0.06		0.01	c0.08		c0.10	0.22		0.05	c0.39	
v/s Ratio Perm			0.03			0.06						
v/c Ratio	0.90	0.23	0.11	0.62	0.42	0.31	0.90	0.50		0.60	0.92	
Uniform Delay, d1	40.6	26.5	25.7	43.6	32.1	31.5	39.6	17.9		39.4	24.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.77	0.57		1.00	1.00	
Incremental Delay, d2	28.4	0.2	0.1	25.5	0.4	0.6	22.6	0.7		5.9	8.6	
Delay (s)	69.0	26.7	25.8	69.1	32.6	32.1	52.9	10.9		45.3	33.1	
Level of Service	E	C	C	E	C	C	D	B		D	C	
Approach Delay (s)		42.3			33.7			20.6			33.7	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Attachment V

HCM Signalized Intersection Capacity Analysis
4: Mission Blvd/Mission Boulevard & Garin Avenue

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑↑	↱	↰	↑↑↑
Traffic Volume (vph)	21	104	1119	20	85	1407
Future Volume (vph)	21	104	1119	20	85	1407
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.7	3.7	4.9	4.9	3.7	4.9
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.91
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)	1770	1583	3539	1583	1770	5085
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	5085
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	113	1216	22	92	1529
RTOR Reduction (vph)	0	96	0	4	0	0
Lane Group Flow (vph)	23	17	1216	18	92	1529
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2		
Actuated Green, G (s)	13.8	13.8	55.1	55.1	8.8	67.6
Effective Green, g (s)	13.8	13.8	55.1	55.1	8.8	67.6
Actuated g/C Ratio	0.15	0.15	0.61	0.61	0.10	0.75
Clearance Time (s)	3.7	3.7	4.9	4.9	3.7	4.9
Vehicle Extension (s)	2.0	2.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	271	242	2166	969	173	3819
v/s Ratio Prot	c0.01		c0.34		c0.05	0.30
v/s Ratio Perm		0.01		0.01		
v/c Ratio	0.08	0.07	0.56	0.02	0.53	0.40
Uniform Delay, d1	32.7	32.6	10.3	6.8	38.6	4.0
Progression Factor	1.00	1.00	0.82	0.19	0.59	0.28
Incremental Delay, d2	0.0	0.0	1.0	0.0	1.0	0.2
Delay (s)	32.7	32.7	9.4	1.3	23.7	1.3
Level of Service	C	C	A	A	C	A
Approach Delay (s)	32.7		9.3			2.6
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	6.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Mission Boulevard/Mission Blvd & Arrowhead Way

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↑↱		↰	↑↱	
Traffic Volume (vph)	24	25	54	19	25	23	15	1077	8	35	1386	4
Future Volume (vph)	24	25	54	19	25	23	15	1077	8	35	1386	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6		3.6	3.6		4.2	5.2		4.2	5.2	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.93		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1671		1770	1728		1770	3535		1770	3538	
Flt Permitted	0.72	1.00		0.68	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1347	1671		1270	1728		1770	3535		1770	3538	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	27	59	21	27	25	16	1171	9	38	1507	4
RTOR Reduction (vph)	0	51	0	0	22	0	0	0	0	0	0	0
Lane Group Flow (vph)	26	35	0	21	30	0	16	1180	0	38	1511	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	11.8	11.8		11.8	11.8		1.8	59.8		5.4	63.4	
Effective Green, g (s)	11.8	11.8		11.8	11.8		1.8	59.8		5.4	63.4	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.02	0.66		0.06	0.70	
Clearance Time (s)	3.6	3.6		3.6	3.6		4.2	5.2		4.2	5.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	176	219		166	226		35	2348		106	2492	
v/s Ratio Prot		c0.02			0.02		0.01	c0.33		0.02	c0.43	
v/s Ratio Perm	0.02			0.02								
v/c Ratio	0.15	0.16		0.13	0.13		0.46	0.50		0.36	0.61	
Uniform Delay, d1	34.6	34.7		34.5	34.6		43.6	7.6		40.6	6.9	
Progression Factor	1.00	1.00		1.00	1.00		0.97	0.84		1.19	0.24	
Incremental Delay, d2	0.4	0.3		0.3	0.3		8.3	0.7		1.9	1.0	
Delay (s)	35.0	35.0		34.9	34.9		50.6	7.0		50.3	2.7	
Level of Service	D	D		C	C		D	A		D	A	
Approach Delay (s)		35.0			34.9			7.6			3.9	
Approach LOS		D			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Mission Boulevard & Fairway St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱			↰↑	↱	↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	176	89	15	63	25	41	1	852	32	20	1372	61
Future Volume (vph)	176	89	15	63	25	41	1	852	32	20	1372	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.6			3.6	3.6	4.2	5.2		4.2	5.2	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt		0.99			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		0.97			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1793			1798	1583	1770	3520		1770	3517	
Flt Permitted		0.75			0.71	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1393			1317	1583	1770	3520		1770	3517	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	191	97	16	68	27	45	1	926	35	22	1491	66
RTOR Reduction (vph)	0	3	0	0	0	32	0	2	0	0	3	0
Lane Group Flow (vph)	0	301	0	0	95	13	1	959	0	22	1554	0
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		25.5			25.5	25.5	1.8	47.9		3.6	49.7	
Effective Green, g (s)		25.5			25.5	25.5	1.8	47.9		3.6	49.7	
Actuated g/C Ratio		0.28			0.28	0.28	0.02	0.53		0.04	0.55	
Clearance Time (s)		3.6			3.6	3.6	4.2	5.2		4.2	5.2	
Vehicle Extension (s)		2.0			2.0	2.0	2.0	4.5		2.0	4.6	
Lane Grp Cap (vph)		394			373	448	35	1873		70	1942	
v/s Ratio Prot							0.00	c0.27		0.01	c0.44	
v/s Ratio Perm		c0.22			0.07	0.01						
v/c Ratio		0.76			0.25	0.03	0.03	0.51		0.31	0.80	
Uniform Delay, d1		29.5			24.9	23.3	43.2	13.5		42.0	16.2	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.24	0.41	
Incremental Delay, d2		7.7			0.1	0.0	0.1	1.0		0.8	3.1	
Delay (s)		37.2			25.0	23.3	43.4	14.5		53.0	9.7	
Level of Service		D			C	C	D	B		D	A	
Approach Delay (s)		37.2			24.5			14.6			10.3	
Approach LOS		D			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Arrowhead Way/Dixon St & Industrial Pkwy

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑		↰	↑↱		↰	↱			↰	↱
Traffic Volume (vph)	218	0	661	5	1202	65	119	28	14	115	25	255
Future Volume (vph)	218	0	661	5	1202	65	119	28	14	115	25	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	1.00
Frt	1.00	0.85		1.00	0.99		1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.96	1.00
Satd. Flow (prot)	1770	3008		1770	3512		1770	1770			1789	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.61	1.00			0.73	1.00
Satd. Flow (perm)	1770	3008		1770	3512		1134	1770			1365	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	237	0	718	5	1307	71	129	30	15	125	27	277
RTOR Reduction (vph)	0	260	0	0	4	0	0	12	0	0	0	225
Lane Group Flow (vph)	237	458	0	5	1374	0	129	33	0	0	152	52
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	13.2	51.0		1.0	38.8		13.9	13.9			13.9	13.9
Effective Green, g (s)	13.2	51.0		1.0	38.8		13.9	13.9			13.9	13.9
Actuated g/C Ratio	0.17	0.64		0.01	0.49		0.17	0.17			0.17	0.17
Clearance Time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	5.0
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	292	1920		22	1705		197	307			237	275
v/s Ratio Prot	c0.13	0.15		0.00	c0.39			0.02				
v/s Ratio Perm							c0.11				0.11	0.03
v/c Ratio	0.81	0.24		0.23	0.81		0.65	0.11			0.64	0.19
Uniform Delay, d1	32.2	6.2		39.1	17.4		30.8	27.8			30.7	28.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	14.9	0.1		1.9	3.3		5.8	0.1			4.4	0.1
Delay (s)	47.0	6.3		41.0	20.7		36.6	27.8			35.1	28.3
Level of Service	D	A		D	C		D	C			D	C
Approach Delay (s)		16.4			20.7			34.3			30.7	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	79.9	Sum of lost time (s)	14.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: Mission Boulevard & Tennyson Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑	↱		↰↑	↱	↰↰	↑↑↑↱		↰	↑↑↑	↱
Traffic Volume (vph)	352	4	248	9	17	2	380	1695	1	32	1198	328
Future Volume (vph)	352	4	248	9	17	2	380	1695	1	32	1198	328
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0	4.0	4.0	5.0		4.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00		1.00	1.00	0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583		1830	1583	3433	5085		1770	5085	1583
Flt Permitted	0.95	1.00	1.00		0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583		1830	1583	3433	5085		1770	5085	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	383	4	270	10	18	2	413	1842	1	35	1302	357
RTOR Reduction (vph)	0	0	225	0	0	2	0	0	0	0	0	131
Lane Group Flow (vph)	383	4	45	0	28	0	413	1843	0	35	1302	226
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	3	3		4	4		1	6		5	2	
Permitted Phases			3			4						2
Actuated Green, G (s)	23.2	23.2	23.2		9.8	9.8	19.4	84.2		4.8	69.6	69.6
Effective Green, g (s)	23.2	23.2	23.2		9.8	9.8	19.4	84.2		4.8	69.6	69.6
Actuated g/C Ratio	0.17	0.17	0.17		0.07	0.07	0.14	0.60		0.03	0.50	0.50
Clearance Time (s)	5.0	5.0	5.0		4.0	4.0	4.0	5.0		4.0	5.0	5.0
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)	568	308	262		128	110	475	3058		60	2527	786
v/s Ratio Prot	c0.11	0.00			c0.02		c0.12	c0.36		0.02	0.26	
v/s Ratio Perm			0.03			0.00						0.14
v/c Ratio	0.67	0.01	0.17		0.22	0.00	0.87	0.60		0.58	0.52	0.29
Uniform Delay, d1	54.9	48.8	50.1		61.5	60.5	59.1	17.4		66.6	23.8	20.6
Progression Factor	1.00	1.00	1.00		1.00	1.00	0.97	1.04		1.00	1.00	1.00
Incremental Delay, d2	3.2	0.0	0.3		0.9	0.0	11.2	0.6		13.6	0.8	0.9
Delay (s)	58.0	48.8	50.5		62.3	60.6	68.4	18.7		80.2	24.6	21.6
Level of Service	E	D	D		E	E	E	B		F	C	C
Approach Delay (s)		54.8			62.2			27.8			25.1	
Approach LOS		D			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Mission Boulevard & Valle Vista

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥		↰	↑↱		↰	↑↱	
Traffic Volume (vph)	22	0	35	0	0	0	41	2035	0	13	1417	40
Future Volume (vph)	22	0	35	0	0	0	41	2035	0	13	1417	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	5.0		4.0	5.0	
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	
Frt		0.92					1.00	1.00		1.00	1.00	
Flt Protected		0.98					0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1676					1770	3539		1770	3525	
Flt Permitted		0.87					0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1491					1770	3539		1770	3525	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	0	38	0	0	0	45	2212	0	14	1540	43
RTOR Reduction (vph)	0	58	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	4	0	0	0	0	45	2212	0	14	1582	0
Turn Type	Perm	NA					Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		9.1					7.1	115.5		2.4	110.8	
Effective Green, g (s)		9.1					7.1	115.5		2.4	110.8	
Actuated g/C Ratio		0.06					0.05	0.82		0.02	0.79	
Clearance Time (s)		4.0					4.0	5.0		4.0	5.0	
Vehicle Extension (s)		3.0					3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		96					89	2919		30	2789	
v/s Ratio Prot							0.03	c0.62		0.01	c0.45	
v/s Ratio Perm		c0.00										
v/c Ratio		0.04					0.51	0.76		0.47	0.57	
Uniform Delay, d1		61.4					64.7	5.7		68.2	5.5	
Progression Factor		1.00					1.05	1.78		0.88	0.78	
Incremental Delay, d2		0.2					4.2	1.8		9.9	0.7	
Delay (s)		61.5					71.9	11.9		69.8	5.1	
Level of Service		E					E	B		E	A	
Approach Delay (s)		61.5			0.0			13.1			5.6	
Approach LOS		E			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Attachment V

HCM Signalized Intersection Capacity Analysis
3: Mission Boulevard & Industrial Pkwy

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↱	↱	↰	↑↑	↱	↰↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	534	168	450	6	131	175	252	1345	11	104	966	302
Future Volume (vph)	534	168	450	6	131	175	252	1345	11	104	966	302
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	5.0		4.0	5.0	
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.97	0.91		1.00	0.91	
Frt	1.00	0.91	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3099	1441	1770	3539	1583	3433	5079		1770	4904	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3099	1441	1770	3539	1583	3433	5079		1770	4904	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	580	183	489	7	142	190	274	1462	12	113	1050	328
RTOR Reduction (vph)	0	165	165	0	0	170	0	1	0	0	35	0
Lane Group Flow (vph)	580	263	79	7	142	20	274	1473	0	113	1343	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	31.4	45.5	45.5	0.8	14.9	14.9	15.5	63.0		13.7	61.2	
Effective Green, g (s)	31.4	45.5	45.5	0.8	14.9	14.9	15.5	63.0		13.7	61.2	
Actuated g/C Ratio	0.22	0.32	0.32	0.01	0.11	0.11	0.11	0.45		0.10	0.44	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0		4.0	5.0	
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)	769	1007	468	10	376	168	380	2285		173	2143	
v/s Ratio Prot	c0.17	0.08		0.00	c0.04		c0.08	c0.29		0.06	0.27	
v/s Ratio Perm			0.06			0.01						
v/c Ratio	0.75	0.26	0.17	0.70	0.38	0.12	0.72	0.64		0.65	0.63	
Uniform Delay, d1	50.7	34.8	33.8	69.5	58.2	56.6	60.2	29.8		60.9	30.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.83	0.50		1.00	0.52	
Incremental Delay, d2	4.2	0.1	0.2	117.6	0.6	0.3	5.2	1.1		7.3	1.2	
Delay (s)	54.9	35.0	33.9	187.1	58.9	56.9	54.9	16.1		68.1	17.1	
Level of Service	D	C	C	F	E	E	D	B		E	B	
Approach Delay (s)		44.0			60.4			22.2			20.9	
Approach LOS		D			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Attachment V

HCM Signalized Intersection Capacity Analysis
4: Mission Blvd/Mission Boulevard & Garin Avenue

	↙	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑↑	↱	↰	↑↑↑
Traffic Volume (vph)	33	79	1490	33	127	1296
Future Volume (vph)	33	79	1490	33	127	1296
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.7	3.7	4.9	4.9	3.7	4.9
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.91
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)	1770	1583	3539	1583	1770	5085
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	5085
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	86	1620	36	138	1409
RTOR Reduction (vph)	0	76	0	4	0	0
Lane Group Flow (vph)	36	10	1620	32	138	1409
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2		
Actuated Green, G (s)	16.2	16.2	96.7	96.7	14.8	115.2
Effective Green, g (s)	16.2	16.2	96.7	96.7	14.8	115.2
Actuated g/C Ratio	0.12	0.12	0.69	0.69	0.11	0.82
Clearance Time (s)	3.7	3.7	4.9	4.9	3.7	4.9
Vehicle Extension (s)	2.0	2.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	204	183	2444	1093	187	4184
v/s Ratio Prot	c0.02		c0.46		c0.08	0.28
v/s Ratio Perm		0.01		0.02		
v/c Ratio	0.18	0.05	0.66	0.03	0.74	0.34
Uniform Delay, d1	55.9	55.1	12.4	6.8	60.7	3.0
Progression Factor	1.00	1.00	0.38	0.22	0.88	0.99
Incremental Delay, d2	0.2	0.0	1.2	0.0	10.8	0.2
Delay (s)	56.0	55.1	5.8	1.6	64.4	3.2
Level of Service	E	E	A	A	E	A
Approach Delay (s)	55.4		5.7			8.7
Approach LOS	E		A			A

Intersection Summary			
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Mission Boulevard/Mission Blvd & Arrowhead Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↑↱		↰	↑↱	
Traffic Volume (vph)	11	17	35	19	16	41	60	1469	32	43	1275	24
Future Volume (vph)	11	17	35	19	16	41	60	1469	32	43	1275	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6		3.6	3.6		4.2	5.2		4.2	5.2	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.89		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1673		1770	1660		1770	3528		1770	3529	
Flt Permitted	0.66	1.00		0.69	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1225	1673		1283	1660		1770	3528		1770	3529	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	18	38	21	17	45	65	1597	35	47	1386	26
RTOR Reduction (vph)	0	35	0	0	41	0	0	1	0	0	0	0
Lane Group Flow (vph)	12	21	0	21	21	0	65	1631	0	47	1412	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	11.8	11.8		11.8	11.8		9.8	107.4		7.8	105.4	
Effective Green, g (s)	11.8	11.8		11.8	11.8		9.8	107.4		7.8	105.4	
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.07	0.77		0.06	0.75	
Clearance Time (s)	3.6	3.6		3.6	3.6		4.2	5.2		4.2	5.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	103	141		108	139		123	2706		98	2656	
v/s Ratio Prot		0.01			0.01		0.04	c0.46		0.03	c0.40	
v/s Ratio Perm	0.01			c0.02								
v/c Ratio	0.12	0.15		0.19	0.15		0.53	0.60		0.48	0.53	
Uniform Delay, d1	59.3	59.5		59.7	59.4		62.9	7.1		64.1	7.1	
Progression Factor	1.00	1.00		1.00	1.00		0.73	0.36		1.07	0.73	
Incremental Delay, d2	0.5	0.5		0.9	0.5		2.9	0.7		3.5	0.7	
Delay (s)	59.8	59.9		60.6	59.9		49.0	3.3		71.9	5.9	
Level of Service	E	E		E	E		D	A		E	A	
Approach Delay (s)		59.9			60.1			5.0			8.1	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Mission Boulevard & Fairway St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			↰	↱	↰	↑↱		↰	↑↱	
Traffic Volume (vph)	133	66	11	34	26	15	7	1422	88	38	1209	94
Future Volume (vph)	133	66	11	34	26	15	7	1422	88	38	1209	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.6			3.6	3.6	4.2	5.2		4.2	5.2	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt		0.99			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		0.97			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1793			1811	1583	1770	3508		1770	3501	
Flt Permitted		0.75			0.79	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1389			1463	1583	1770	3508		1770	3501	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	72	12	37	28	16	8	1546	96	41	1314	102
RTOR Reduction (vph)	0	2	0	0	0	13	0	3	0	0	3	0
Lane Group Flow (vph)	0	227	0	0	65	3	8	1639	0	41	1413	0
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		26.9			26.9	26.9	1.8	90.3		9.8	98.3	
Effective Green, g (s)		26.9			26.9	26.9	1.8	90.3		9.8	98.3	
Actuated g/C Ratio		0.19			0.19	0.19	0.01	0.64		0.07	0.70	
Clearance Time (s)		3.6			3.6	3.6	4.2	5.2		4.2	5.2	
Vehicle Extension (s)		2.0			2.0	2.0	2.0	4.5		2.0	4.6	
Lane Grp Cap (vph)		266			281	304	22	2262		123	2458	
v/s Ratio Prot							0.00	c0.47		0.02	c0.40	
v/s Ratio Perm		c0.16			0.04	0.00						
v/c Ratio		0.85			0.23	0.01	0.36	0.72		0.33	0.57	
Uniform Delay, d1		54.7			47.8	45.8	68.5	16.6		62.0	10.4	
Progression Factor		1.00			1.00	1.00	1.00	1.00		0.85	0.54	
Incremental Delay, d2		21.8			0.2	0.0	3.7	2.1		0.5	0.9	
Delay (s)		76.5			48.0	45.8	72.2	18.6		53.2	6.5	
Level of Service		E			D	D	E	B		D	A	
Approach Delay (s)		76.5			47.5			18.9			7.8	
Approach LOS		E			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Arrowhead Way/Dixon St & Industrial Pkwy

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑		↰	↑↱		↰	↱			↰	↱
Traffic Volume (vph)	183	1116	74	8	626	94	68	31	13	65	22	233
Future Volume (vph)	183	1116	74	8	626	94	68	31	13	65	22	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	1.00
Frt	1.00	0.99		1.00	0.98		1.00	0.96			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.96	1.00
Satd. Flow (prot)	1770	3506		1770	3470		1770	1781			1796	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.70	1.00			0.75	1.00
Satd. Flow (perm)	1770	3506		1770	3470		1295	1781			1396	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	199	1213	80	9	680	102	74	34	14	71	24	253
RTOR Reduction (vph)	0	4	0	0	13	0	0	12	0	0	0	211
Lane Group Flow (vph)	199	1289	0	9	769	0	74	36	0	0	95	42
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	11.2	38.5		0.8	28.1		10.6	10.6			10.6	10.6
Effective Green, g (s)	11.2	38.5		0.8	28.1		10.6	10.6			10.6	10.6
Actuated g/C Ratio	0.18	0.60		0.01	0.44		0.17	0.17			0.17	0.17
Clearance Time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	5.0
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	310	2112		22	1525		214	295			231	262
v/s Ratio Prot	c0.11	c0.37		0.01	0.22			0.02				
v/s Ratio Perm							0.06				c0.07	0.03
v/c Ratio	0.64	0.61		0.41	0.50		0.35	0.12			0.41	0.16
Uniform Delay, d1	24.5	8.0		31.3	12.9		23.6	22.7			23.9	22.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	3.4	0.8		4.5	0.6		0.4	0.1			0.4	0.1
Delay (s)	27.9	8.7		35.8	13.4		23.9	22.8			24.3	22.9
Level of Service	C	A		D	B		C	C			C	C
Approach Delay (s)		11.3			13.7			23.5			23.3	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	63.9	Sum of lost time (s)	14.0
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX C: EXISTING PLUS PROJECT LEVEL OF SERVICE WORKSHEETS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑	↱		↰↑	↱	↰↰	↑↑↑↱		↰	↑↑↑	↱
Traffic Volume (vph)	333	3	259	7	5	1	220	1302	0	17	1668	239
Future Volume (vph)	333	3	259	7	5	1	220	1302	0	17	1668	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0	4.0	4.0	5.0		4.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00		1.00	1.00	0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583		1807	1583	3433	5085		1770	5085	1583
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583		1807	1583	3433	5085		1770	5085	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	362	3	282	8	5	1	239	1415	0	18	1813	260
RTOR Reduction (vph)	0	0	237	0	0	1	0	0	0	0	0	66
Lane Group Flow (vph)	362	3	45	0	13	0	239	1415	0	18	1813	194
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	3	3		4	4		1	6		5	2	
Permitted Phases			3			4						2
Actuated Green, G (s)	22.9	22.9	22.9		9.3	9.3	16.5	91.0		2.8	77.3	77.3
Effective Green, g (s)	22.9	22.9	22.9		9.3	9.3	16.5	91.0		2.8	77.3	77.3
Actuated g/C Ratio	0.16	0.16	0.16		0.06	0.06	0.11	0.63		0.02	0.54	0.54
Clearance Time (s)	5.0	5.0	5.0		4.0	4.0	4.0	5.0		4.0	5.0	5.0
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)	545	296	251		116	102	393	3213		34	2729	849
v/s Ratio Prot	c0.11	0.00			c0.01		c0.07	0.28		0.01	c0.36	
v/s Ratio Perm			0.03			0.00						0.12
v/c Ratio	0.66	0.01	0.18		0.11	0.00	0.61	0.44		0.53	0.66	0.23
Uniform Delay, d1	56.9	51.0	52.4		63.5	63.0	60.7	13.5		69.9	24.0	17.6
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	3.0	0.0	0.3		0.4	0.0	2.7	0.4		14.1	1.3	0.6
Delay (s)	60.0	51.0	52.8		63.9	63.0	63.3	14.0		84.0	25.3	18.2
Level of Service	E	D	D		E	E	E	B		F	C	B
Approach Delay (s)		56.8			63.8			21.1			24.9	
Approach LOS		E			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	144.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Attachment V

HCM Signalized Intersection Capacity Analysis
2: Mission Boulevard & Valle Vista

Existing + Project AM

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥		↰	↑↱		↰	↑↱	
Traffic Volume (vph)	16	0	41	0	0	0	95	1428	0	15	1912	39
Future Volume (vph)	16	0	41	0	0	0	95	1428	0	15	1912	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	5.0		4.0	5.0	
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	
Frt		0.90					1.00	1.00		1.00	1.00	
Flt Protected		0.99					0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1658					1770	3539		1770	3529	
Flt Permitted		0.91					0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1534					1770	3539		1770	3529	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	0	45	0	0	0	103	1552	0	16	2078	42
RTOR Reduction (vph)	0	58	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	4	0	0	0	0	103	1552	0	16	2119	0
Turn Type	Perm	NA					Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		9.1					15.5	120.2		2.7	107.4	
Effective Green, g (s)		9.1					15.5	120.2		2.7	107.4	
Actuated g/C Ratio		0.06					0.11	0.83		0.02	0.74	
Clearance Time (s)		4.0					4.0	5.0		4.0	5.0	
Vehicle Extension (s)		3.0					3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		96					189	2933		32	2613	
v/s Ratio Prot							0.06	c0.44		0.01	c0.60	
v/s Ratio Perm		c0.00										
v/c Ratio		0.04					0.54	0.53		0.50	0.81	
Uniform Delay, d1		63.8					61.4	3.8		70.5	12.2	
Progression Factor		1.00					1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2					3.2	0.7		11.8	2.9	
Delay (s)		64.0					64.6	4.5		82.2	15.1	
Level of Service		E					E	A		F	B	
Approach Delay (s)		64.0			0.0			8.2			15.6	
Approach LOS		E			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Attachment V

HCM Signalized Intersection Capacity Analysis
Existing + Project AM

3: Mission Boulevard & Industrial Pkwy

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↱	↱	↰	↑↑	↱	↰↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	277	133	291	22	257	288	311	1033	14	135	1188	683
Future Volume (vph)	277	133	291	22	257	288	311	1033	14	135	1188	683
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	5.0		4.0	5.0	
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.97	0.91		1.00	0.91	
Frt	1.00	0.92	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3125	1441	1770	3539	1583	3433	5075		1770	4807	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3125	1441	1770	3539	1583	3433	5075		1770	4807	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	301	145	316	24	279	313	338	1123	15	147	1291	742
RTOR Reduction (vph)	0	123	123	0	0	177	0	1	0	0	56	0
Lane Group Flow (vph)	301	180	35	24	279	136	338	1137	0	147	1977	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	17.3	36.3	36.3	3.6	22.6	22.6	19.7	88.4		17.7	86.4	
Effective Green, g (s)	17.3	36.3	36.3	3.6	22.6	22.6	19.7	88.4		17.7	86.4	
Actuated g/C Ratio	0.11	0.22	0.22	0.02	0.14	0.14	0.12	0.54		0.11	0.53	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0		4.0	5.0	
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)	364	695	320	39	490	219	414	2752		192	2548	
v/s Ratio Prot	c0.09	0.06		0.01	0.08		c0.10	0.22		0.08	c0.41	
v/s Ratio Perm			0.02			c0.09						
v/c Ratio	0.83	0.26	0.11	0.62	0.57	0.62	0.82	0.41		0.77	0.78	
Uniform Delay, d1	71.4	52.3	50.5	79.0	65.6	66.1	69.9	22.0		70.6	30.6	
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	14.2	0.2	0.2	25.5	1.5	5.1	11.8	0.5		16.5	2.4	
Delay (s)	85.6	52.5	50.6	104.5	67.2	71.3	81.7	22.5		87.2	33.0	
Level of Service	F	D	D	F	E	E	F	C		F	C	
Approach Delay (s)		65.2			70.7			36.0			36.6	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	44.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	163.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Attachment V

HCM Signalized Intersection Capacity Analysis
4: Mission Blvd/Mission Boulevard & Garin Avenue

Existing + Project AM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑↑	↱	↰	↑↑↑
Traffic Volume (vph)	21	104	1130	20	98	1422
Future Volume (vph)	21	104	1130	20	98	1422
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.7	3.7	4.9	4.9	3.7	4.9
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.91
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)	1770	1583	3539	1583	1770	5085
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	5085
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	113	1228	22	107	1546
RTOR Reduction (vph)	0	96	0	4	0	0
Lane Group Flow (vph)	23	17	1228	18	107	1546
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2		
Actuated Green, G (s)	13.8	13.8	57.0	57.0	8.9	69.6
Effective Green, g (s)	13.8	13.8	57.0	57.0	8.9	69.6
Actuated g/C Ratio	0.15	0.15	0.62	0.62	0.10	0.76
Clearance Time (s)	3.7	3.7	4.9	4.9	3.7	4.9
Vehicle Extension (s)	2.0	2.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	265	237	2192	980	171	3846
v/s Ratio Prot	c0.01		c0.35		c0.06	0.30
v/s Ratio Perm		0.01		0.01		
v/c Ratio	0.09	0.07	0.56	0.02	0.63	0.40
Uniform Delay, d1	33.7	33.6	10.2	6.7	39.9	3.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0	1.0	0.0	5.1	0.3
Delay (s)	33.7	33.6	11.2	6.8	45.0	4.2
Level of Service	C	C	B	A	D	A
Approach Delay (s)	33.7		11.2			6.9
Approach LOS	C		B			A

Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	92.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
Existing + Project AM

5: Mission Boulevard/Mission Blvd & Arrowhead Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↑↱		↰	↑↱	
Traffic Volume (vph)	24	25	54	19	25	23	16	1088	8	36	1401	4
Future Volume (vph)	24	25	54	19	25	23	16	1088	8	36	1401	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6		3.6	3.6		4.2	5.2		4.2	5.2	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.93		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1671		1770	1728		1770	3535		1770	3538	
Flt Permitted	0.72	1.00		0.67	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1347	1671		1243	1728		1770	3535		1770	3538	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	27	59	21	27	25	17	1183	9	39	1523	4
RTOR Reduction (vph)	0	52	0	0	22	0	0	0	0	0	0	0
Lane Group Flow (vph)	26	34	0	21	30	0	17	1192	0	39	1527	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	11.8	11.8		11.8	11.8		3.6	64.8		5.4	66.6	
Effective Green, g (s)	11.8	11.8		11.8	11.8		3.6	64.8		5.4	66.6	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.04	0.68		0.06	0.70	
Clearance Time (s)	3.6	3.6		3.6	3.6		4.2	5.2		4.2	5.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	167	207		154	214		67	2411		100	2480	
v/s Ratio Prot		c0.02			0.02		0.01	c0.34		0.02	c0.43	
v/s Ratio Perm	0.02			0.02								
v/c Ratio	0.16	0.17		0.14	0.14		0.25	0.49		0.39	0.62	
Uniform Delay, d1	37.2	37.2		37.1	37.1		44.4	7.2		43.2	7.5	
Progression Factor	1.00	1.00		1.00	1.00		0.70	0.59		1.00	1.00	
Incremental Delay, d2	0.4	0.4		0.4	0.3		1.8	0.7		2.5	1.2	
Delay (s)	37.6	37.6		37.5	37.4		32.7	5.0		45.7	8.6	
Level of Service	D	D		D	D		C	A		D	A	
Approach Delay (s)		37.6			37.4			5.3			9.5	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Mission Boulevard & Fairway St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			↰	↱	↰	↑↱		↰	↑↱	
Traffic Volume (vph)	176	89	15	63	25	41	1	863	32	24	1387	61
Future Volume (vph)	176	89	15	63	25	41	1	863	32	24	1387	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.6			3.6	3.6	4.2	5.2		4.2	5.2	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt		0.99			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		0.97			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1793			1798	1583	1770	3520		1770	3517	
Flt Permitted		0.75			0.71	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1380			1314	1583	1770	3520		1770	3517	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	191	97	16	68	27	45	1	938	35	26	1508	66
RTOR Reduction (vph)	0	2	0	0	0	33	0	2	0	0	3	0
Lane Group Flow (vph)	0	302	0	0	95	12	1	971	0	26	1571	0
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		26.1			26.1	26.1	1.8	51.4		4.5	54.1	
Effective Green, g (s)		26.1			26.1	26.1	1.8	51.4		4.5	54.1	
Actuated g/C Ratio		0.27			0.27	0.27	0.02	0.54		0.05	0.57	
Clearance Time (s)		3.6			3.6	3.6	4.2	5.2		4.2	5.2	
Vehicle Extension (s)		2.0			2.0	2.0	2.0	4.5		2.0	4.6	
Lane Grp Cap (vph)		379			361	434	33	1904		83	2002	
v/s Ratio Prot							0.00	c0.28		0.01	c0.45	
v/s Ratio Perm		c0.22			0.07	0.01						
v/c Ratio		0.80			0.26	0.03	0.03	0.51		0.31	0.78	
Uniform Delay, d1		32.0			26.9	25.2	45.7	13.8		43.8	15.9	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.04	0.95	
Incremental Delay, d2		10.3			0.1	0.0	0.1	1.0		0.7	2.7	
Delay (s)		42.3			27.1	25.2	45.9	14.8		46.1	17.8	
Level of Service		D			C	C	D	B		D	B	
Approach Delay (s)		42.3			26.5			14.8			18.2	
Approach LOS		D			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	70.0%	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 (vph)	225	674	29	13	1228	69	119	28	14	115	25	255
Future Volume (vph)	225	674	29	13	1228	69	119	28	14	115	25	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.96	1.00
Satd. Flow (prot)	1770	3517		1770	3511		1770	1770			1789	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.61	1.00			0.73	1.00
Satd. Flow (perm)	1770	3517		1770	3511		1133	1770			1365	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	245	733	32	14	1335	75	129	30	15	125	27	277
RTOR Reduction (vph)	0	3	0	0	4	0	0	12	0	0	0	224
Lane Group Flow (vph)	245	762	0	14	1406	0	129	33	0	0	152	53
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	13.3	51.0		1.1	38.8		13.9	13.9			13.9	13.9
Effective Green, g (s)	13.3	51.0		1.1	38.8		13.9	13.9			13.9	13.9
Actuated g/C Ratio	0.17	0.64		0.01	0.48		0.17	0.17			0.17	0.17
Clearance Time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	5.0
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	294	2242		24	1702		196	307			237	275
v/s Ratio Prot	c0.14	0.22		0.01	c0.40			0.02				
v/s Ratio Perm							c0.11				0.11	0.03
v/c Ratio	0.83	0.34		0.58	0.83		0.66	0.11			0.64	0.19
Uniform Delay, d1	32.3	6.7		39.2	17.7		30.8	27.8			30.7	28.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	17.3	0.2		21.1	3.8		6.0	0.1			4.4	0.1
Delay (s)	49.5	6.9		60.4	21.5		36.8	27.9			35.1	28.4
Level of Service	D	A		E	C		D	C			D	C
Approach Delay (s)		17.2			21.9			34.5			30.8	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

28: Mission Boulevard & South Driveway

	↗	↘	↖	↑	↓	↙
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑↑	↑↑↱	
Traffic Volume (veh/h)	0	45	0	1628	1942	34
Future Volume (Veh/h)	0	45	0	1628	1942	34
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	49	0	1770	2111	37
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				431		
pX, platoon unblocked	0.85					
vC, conflicting volume	3014	722	2148			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3017	722	2148			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	87	100			
cM capacity (veh/h)	9	369	247			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	49	885	885	844	844	459
Volume Left	0	0	0	0	0	0
Volume Right	49	0	0	0	0	37
cSH	369	1700	1700	1700	1700	1700
Volume to Capacity	0.13	0.52	0.52	0.50	0.50	0.27
Queue Length 95th (ft)	11	0	0	0	0	0
Control Delay (s)	16.2	0.0	0.0	0.0	0.0	0.0
Lane LOS	C					
Approach Delay (s)	16.2	0.0		0.0		
Approach LOS	C					

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis

Existing + Project AM

31: Mission Boulevard & North Driveway

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑↑	↑↱	
Traffic Volume (veh/h)	0	30	0	1628	1942	22
Future Volume (Veh/h)	0	30	0	1628	1942	22
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	33	0	1770	2111	24
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				577	1214	
pX, platoon unblocked	0.38	0.30	0.30			
vC, conflicting volume	3008	1068	2135			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1183	0	143			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	90	100			
cM capacity (veh/h)	69	328	435			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	33	885	885	1407	728
Volume Left	0	0	0	0	0
Volume Right	33	0	0	0	24
cSH	328	1700	1700	1700	1700
Volume to Capacity	0.10	0.52	0.52	0.83	0.43
Queue Length 95th (ft)	8	0	0	0	0
Control Delay (s)	17.2	0.0	0.0	0.0	0.0
Lane LOS	C				
Approach Delay (s)	17.2	0.0		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
1: Mission Boulevard & Tennyson Road

07/09/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑	↱		↰	↱	↰↰	↑↑↱		↰	↑↑↑	↱
Traffic Volume (vph)	352	4	259	9	17	2	389	1704	1	32	1209	328
Future Volume (vph)	352	4	259	9	17	2	389	1704	1	32	1209	328
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0	4.0	4.0	5.0		4.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00		1.00	1.00	0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583		1830	1583	3433	5085		1770	5085	1583
Flt Permitted	0.95	1.00	1.00		0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583		1830	1583	3433	5085		1770	5085	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	383	4	282	10	18	2	423	1852	1	35	1314	357
RTOR Reduction (vph)	0	0	237	0	0	2	0	0	0	0	0	115
Lane Group Flow (vph)	383	4	45	0	28	0	423	1853	0	35	1314	242
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	3	3		4	4		1	6		5	2	
Permitted Phases			3			4						2
Actuated Green, G (s)	24.3	24.3	24.3		9.9	9.9	22.9	94.5		6.3	77.9	77.9
Effective Green, g (s)	24.3	24.3	24.3		9.9	9.9	22.9	94.5		6.3	77.9	77.9
Actuated g/C Ratio	0.16	0.16	0.16		0.06	0.06	0.15	0.62		0.04	0.51	0.51
Clearance Time (s)	5.0	5.0	5.0		4.0	4.0	4.0	5.0		4.0	5.0	5.0
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)	545	295	251		118	102	513	3140		72	2589	805
v/s Ratio Prot	c0.11	0.00			c0.02		c0.12	c0.36		0.02	0.26	
v/s Ratio Perm			0.03			0.00						0.15
v/c Ratio	0.70	0.01	0.18		0.24	0.00	0.82	0.59		0.49	0.51	0.30
Uniform Delay, d1	60.9	54.2	55.7		68.0	66.9	63.1	17.6		71.8	24.9	21.8
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.03	1.31		1.00	1.00	1.00
Incremental Delay, d2	4.1	0.0	0.3		1.0	0.0	6.9	0.5		5.1	0.7	1.0
Delay (s)	65.0	54.3	56.1		69.0	66.9	71.7	23.5		76.9	25.6	22.7
Level of Service	E	D	E		E	E	E	C		E	C	C
Approach Delay (s)		61.2			68.9			32.5			26.0	
Approach LOS		E			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	34.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	153.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Mission Boulevard & Valle Vista

07/09/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥		↰	↑↱		↰	↑↱	
Traffic Volume (vph)	22	0	44	0	0	0	65	2076	0	13	1417	40
Future Volume (vph)	22	0	44	0	0	0	65	2076	0	13	1417	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	5.0		4.0	5.0	
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	
Frt		0.91					1.00	1.00		1.00	1.00	
Flt Protected		0.98					0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1667					1770	3539		1770	3525	
Flt Permitted		0.89					0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1513					1770	3539		1770	3525	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	0	48	0	0	0	71	2257	0	14	1540	43
RTOR Reduction (vph)	0	67	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	5	0	0	0	0	71	2257	0	14	1582	0
Turn Type	Perm	NA					Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		10.5					15.9	126.8		2.7	113.6	
Effective Green, g (s)		10.5					15.9	126.8		2.7	113.6	
Actuated g/C Ratio		0.07					0.10	0.83		0.02	0.74	
Clearance Time (s)		4.0					4.0	5.0		4.0	5.0	
Vehicle Extension (s)		3.0					3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		103					183	2932		31	2617	
v/s Ratio Prot							0.04	c0.64		0.01	c0.45	
v/s Ratio Perm		c0.00										
v/c Ratio		0.05					0.39	0.77		0.45	0.60	
Uniform Delay, d1		66.6					64.0	6.2		74.4	9.2	
Progression Factor		1.00					0.90	1.56		0.85	1.97	
Incremental Delay, d2		0.2					1.0	1.5		9.0	0.9	
Delay (s)		66.8					58.7	11.2		72.3	19.0	
Level of Service		E					E	B		E	B	
Approach Delay (s)		66.8			0.0			12.7			19.5	
Approach LOS		E			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	153.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Mission Boulevard & Industrial Pkwy

07/09/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↱	↱	↰	↑↑	↱	↰↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	581	168	450	6	131	175	255	1356	11	159	975	318
Future Volume (vph)	581	168	450	6	131	175	255	1356	11	159	975	318
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	5.0		4.0	5.0	
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.97	0.91		1.00	0.91	
Frt	1.00	0.91	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3099	1441	1770	3539	1583	3433	5079		1770	4898	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3099	1441	1770	3539	1583	3433	5079		1770	4898	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	632	183	489	7	142	190	277	1474	12	173	1060	346
RTOR Reduction (vph)	0	165	164	0	0	167	0	1	0	0	35	0
Lane Group Flow (vph)	632	263	80	7	142	23	277	1485	0	173	1371	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	32.4	50.0	50.0	0.8	18.4	18.4	19.8	67.1		18.1	65.4	
Effective Green, g (s)	32.4	50.0	50.0	0.8	18.4	18.4	19.8	67.1		18.1	65.4	
Actuated g/C Ratio	0.21	0.33	0.33	0.01	0.12	0.12	0.13	0.44		0.12	0.43	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0		4.0	5.0	
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)	726	1012	470	9	425	190	444	2227		209	2093	
v/s Ratio Prot	c0.18	0.08		0.00	c0.04		0.08	c0.29		c0.10	0.28	
v/s Ratio Perm			0.06			0.01						
v/c Ratio	0.87	0.26	0.17	0.78	0.33	0.12	0.62	0.67		0.83	0.65	
Uniform Delay, d1	58.3	37.9	36.7	76.0	61.7	60.1	63.1	34.1		65.9	34.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.03	1.18	
Incremental Delay, d2	11.1	0.1	0.2	167.2	0.5	0.3	2.7	1.6		19.8	1.4	
Delay (s)	69.4	38.0	36.9	243.2	62.2	60.4	65.8	35.7		87.6	42.4	
Level of Service	E	D	D	F	E	E	E	D		F	D	
Approach Delay (s)		53.0			64.9			40.4			47.3	
Approach LOS		D			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	47.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	153.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Attachment V

HCM Signalized Intersection Capacity Analysis
4: Mission Blvd/Mission Boulevard & Garin Avenue

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑↑	↱	↰	↑↑↑
Traffic Volume (vph)	33	79	1501	33	138	1305
Future Volume (vph)	33	79	1501	33	138	1305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.7	3.7	4.9	4.9	3.7	4.9
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.91
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)	1770	1583	3539	1583	1770	5085
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	5085
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	86	1632	36	150	1418
RTOR Reduction (vph)	0	73	0	6	0	0
Lane Group Flow (vph)	36	13	1632	30	150	1418
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2		
Actuated Green, G (s)	12.5	12.5	49.0	49.0	11.8	64.5
Effective Green, g (s)	12.5	12.5	49.0	49.0	11.8	64.5
Actuated g/C Ratio	0.15	0.15	0.57	0.57	0.14	0.75
Clearance Time (s)	3.7	3.7	4.9	4.9	3.7	4.9
Vehicle Extension (s)	2.0	2.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	258	231	2025	906	243	3831
v/s Ratio Prot	c0.02		c0.46		c0.08	0.28
v/s Ratio Perm		0.01		0.02		
v/c Ratio	0.14	0.05	0.81	0.03	0.62	0.37
Uniform Delay, d1	31.9	31.5	14.5	8.0	34.8	3.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0	3.5	0.1	3.3	0.3
Delay (s)	32.0	31.5	18.1	8.0	38.0	3.9
Level of Service	C	C	B	A	D	A
Approach Delay (s)	31.6		17.9			7.1
Approach LOS	C		B			A

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	85.6	Sum of lost time (s)	12.3
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Mission Boulevard/Mission Blvd & Arrowhead Way

07/09/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↑↱		↰	↑↱	
Traffic Volume (vph)	11	17	35	19	16	41	62	1480	32	60	1284	24
Future Volume (vph)	11	17	35	19	16	41	62	1480	32	60	1284	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6		3.6	3.6		4.2	5.2		4.2	5.2	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.89		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1673		1770	1660		1770	3528		1770	3530	
Flt Permitted	0.72	1.00		0.72	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1335	1673		1342	1660		1770	3528		1770	3530	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	18	38	21	17	45	67	1609	35	65	1396	26
RTOR Reduction (vph)	0	33	0	0	39	0	0	1	0	0	1	0
Lane Group Flow (vph)	12	23	0	21	23	0	67	1643	0	65	1421	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	11.8	11.8		11.8	11.8		8.2	62.8		7.4	62.0	
Effective Green, g (s)	11.8	11.8		11.8	11.8		8.2	62.8		7.4	62.0	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.09	0.66		0.08	0.65	
Clearance Time (s)	3.6	3.6		3.6	3.6		4.2	5.2		4.2	5.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	165	207		166	206		152	2332		137	2303	
v/s Ratio Prot		0.01			0.01		0.04	c0.47		0.04	c0.40	
v/s Ratio Perm	0.01			c0.02								
v/c Ratio	0.07	0.11		0.13	0.11		0.44	0.70		0.47	0.62	
Uniform Delay, d1	36.8	36.9		37.0	36.9		41.2	10.2		41.9	9.6	
Progression Factor	1.00	1.00		1.00	1.00		0.78	0.70		1.00	1.00	
Incremental Delay, d2	0.2	0.2		0.3	0.2		1.3	1.2		2.6	1.3	
Delay (s)	37.0	37.2		37.4	37.2		33.4	8.3		44.5	10.8	
Level of Service	D	D		D	D		C	A		D	B	
Approach Delay (s)		37.1			37.2			9.3			12.3	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Attachment V

HCM Signalized Intersection Capacity Analysis
6: Mission Boulevard & Fairway St

07/09/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			↰	↱	↰	↑↱		↰	↑↱	
Traffic Volume (vph)	133	66	11	34	26	15	7	1433	88	38	1218	94
Future Volume (vph)	133	66	11	34	26	15	7	1433	88	38	1218	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.6			3.6	3.6	4.2	5.2		4.2	5.2	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt		0.99			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		0.97			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1793			1811	1583	1770	3508		1770	3501	
Flt Permitted		0.77			0.80	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1422			1490	1583	1770	3508		1770	3501	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	72	12	37	28	16	8	1558	96	41	1324	102
RTOR Reduction (vph)	0	2	0	0	0	12	0	3	0	0	4	0
Lane Group Flow (vph)	0	227	0	0	65	4	8	1651	0	41	1422	0
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		20.9			20.9	20.9	1.8	54.0		7.1	59.3	
Effective Green, g (s)		20.9			20.9	20.9	1.8	54.0		7.1	59.3	
Actuated g/C Ratio		0.22			0.22	0.22	0.02	0.57		0.07	0.62	
Clearance Time (s)		3.6			3.6	3.6	4.2	5.2		4.2	5.2	
Vehicle Extension (s)		2.0			2.0	2.0	2.0	4.5		2.0	4.6	
Lane Grp Cap (vph)		312			327	348	33	1994		132	2185	
v/s Ratio Prot							0.00	c0.47		0.02	c0.41	
v/s Ratio Perm		c0.16			0.04	0.00						
v/c Ratio		0.73			0.20	0.01	0.24	0.83		0.31	0.65	
Uniform Delay, d1		34.4			30.2	29.0	45.9	16.7		41.6	11.3	
Progression Factor		1.00			1.00	1.00	1.00	1.00		0.98	1.10	
Incremental Delay, d2		7.0			0.1	0.0	1.4	4.1		0.4	1.3	
Delay (s)		41.4			30.3	29.0	47.3	20.8		41.4	13.7	
Level of Service		D			C	C	D	C		D	B	
Approach Delay (s)		41.4			30.1			21.0			14.5	
Approach LOS		D			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Arrowhead Way/Dixon St & Industrial Pkwy

07/09/2019

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑		↰	↑↱		↰	↱			↰	↱
Traffic Volume (vph)	196	1129	74	14	642	96	68	31	13	65	22	233
Future Volume (vph)	196	1129	74	14	642	96	68	31	13	65	22	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	1.00
Frt	1.00	0.99		1.00	0.98		1.00	0.96			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.96	1.00
Satd. Flow (prot)	1770	3507		1770	3470		1770	1781			1796	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.70	1.00			0.75	1.00
Satd. Flow (perm)	1770	3507		1770	3470		1295	1781			1396	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	213	1227	80	15	698	104	74	34	14	71	24	253
RTOR Reduction (vph)	0	4	0	0	13	0	0	12	0	0	0	212
Lane Group Flow (vph)	213	1303	0	15	789	0	74	36	0	0	95	41
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	11.8	39.8		1.0	29.0		10.7	10.7			10.7	10.7
Effective Green, g (s)	11.8	39.8		1.0	29.0		10.7	10.7			10.7	10.7
Actuated g/C Ratio	0.18	0.61		0.02	0.44		0.16	0.16			0.16	0.16
Clearance Time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	5.0
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	318	2130		27	1536		211	290			228	258
v/s Ratio Prot	c0.12	c0.37		0.01	0.23			0.02				
v/s Ratio Perm							0.06				c0.07	0.03
v/c Ratio	0.67	0.61		0.56	0.51		0.35	0.13			0.42	0.16
Uniform Delay, d1	25.0	8.0		32.0	13.2		24.3	23.4			24.6	23.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	4.1	0.8		13.3	0.6		0.4	0.1			0.5	0.1
Delay (s)	29.1	8.8		45.3	13.7		24.7	23.5			25.0	23.6
Level of Service	C	A		D	B		C	C			C	C
Approach Delay (s)		11.6			14.3			24.2			24.0	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	65.5	Sum of lost time (s)	14.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
28: Mission Boulevard & South Driveway

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑↑	↑↑↱	
Traffic Volume (veh/h)	0	27	0	2129	1452	33
Future Volume (Veh/h)	0	27	0	2129	1452	33
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	29	0	2314	1578	36
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				431		
pX, platoon unblocked	0.74					
vC, conflicting volume	2753	544	1614			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2666	544	1614			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	94	100			
cM capacity (veh/h)	13	483	400			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	29	1157	1157	631	631	352
Volume Left	0	0	0	0	0	0
Volume Right	29	0	0	0	0	36
cSH	483	1700	1700	1700	1700	1700
Volume to Capacity	0.06	0.68	0.68	0.37	0.37	0.21
Queue Length 95th (ft)	5	0	0	0	0	0
Control Delay (s)	12.9	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	12.9	0.0		0.0		
Approach LOS	B					

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
31: Mission Boulevard & North Driveway

	↗	↘	↖	↑	↓	↙
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑↑	↑↑↱	
Traffic Volume (veh/h)	0	18	0	2129	1452	22
Future Volume (Veh/h)	0	18	0	2129	1452	22
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	20	0	2314	1578	24
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				577	1214	
pX, platoon unblocked	0.79	0.88	0.88			
vC, conflicting volume	2747	538	1602			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1788	10	1216			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	100			
cM capacity (veh/h)	57	943	502			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	20	1157	1157	631	631	340
Volume Left	0	0	0	0	0	0
Volume Right	20	0	0	0	0	24
cSH	943	1700	1700	1700	1700	1700
Volume to Capacity	0.02	0.68	0.68	0.37	0.37	0.20
Queue Length 95th (ft)	2	0	0	0	0	0
Control Delay (s)	8.9	0.0	0.0	0.0	0.0	0.0
Lane LOS	A					
Approach Delay (s)	8.9	0.0		0.0		
Approach LOS	A					

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

APPENDIX D: CUMULATIVE 2035 LEVEL OF SERVICE WORKSHEETS

HCM Signalized Intersection Capacity Analysis
1: Mission Boulevard & Tennyson Road

Cumulative AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑	↱		↰↑	↱	↰↰	↑↑↑↱		↰	↑↑↑	↱
Traffic Volume (vph)	624	17	439	65	80	10	290	1287	0	35	2237	555
Future Volume (vph)	624	17	439	65	80	10	290	1287	0	35	2237	555
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0	4.0	4.0	5.0		4.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00		1.00	1.00	0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583		1822	1583	3433	5085		1770	5085	1583
Flt Permitted	0.95	1.00	1.00		0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583		1822	1583	3433	5085		1770	5085	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	678	18	477	71	87	11	315	1399	0	38	2432	603
RTOR Reduction (vph)	0	0	265	0	0	10	0	0	0	0	0	158
Lane Group Flow (vph)	678	18	212	0	158	1	315	1399	0	38	2432	445
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	3	3		4	4		1	6		5	2	
Permitted Phases			3			4						2
Actuated Green, G (s)	32.3	32.3	32.3		19.6	19.6	22.8	67.7		6.4	51.3	51.3
Effective Green, g (s)	32.3	32.3	32.3		19.6	19.6	22.8	67.7		6.4	51.3	51.3
Actuated g/C Ratio	0.22	0.22	0.22		0.14	0.14	0.16	0.47		0.04	0.36	0.36
Clearance Time (s)	5.0	5.0	5.0		4.0	4.0	4.0	5.0		4.0	5.0	5.0
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)	770	417	355		247	215	543	2390		78	1811	563
v/s Ratio Prot	c0.20	0.01			c0.09		c0.09	0.28		0.02	c0.48	
v/s Ratio Perm			0.13			0.00						0.28
v/c Ratio	0.88	0.04	0.60		0.64	0.01	0.58	0.59		0.49	1.34	0.79
Uniform Delay, d1	54.0	43.7	50.0		58.9	53.8	56.2	27.9		67.2	46.4	41.5
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	11.5	0.0	2.7		5.4	0.0	1.6	1.1		4.7	158.1	10.8
Delay (s)	65.5	43.8	52.7		64.2	53.8	57.7	28.9		71.9	204.5	52.3
Level of Service	E	D	D		E	D	E	C		E	F	D
Approach Delay (s)		59.9			63.5			34.2			173.0	
Approach LOS		E			E			C			F	

Intersection Summary			
HCM 2000 Control Delay	109.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	144.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Attachment V

HCM Signalized Intersection Capacity Analysis
2: Mission Boulevard & Valle Vista Ave

Cumulative AM

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥		↰	↑↱		↰	↑↱	
Traffic Volume (vph)	46	0	133	0	0	0	63	1374	0	15	2707	39
Future Volume (vph)	46	0	133	0	0	0	63	1374	0	15	2707	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	5.0		4.0	5.0	
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	
Frt		0.90					1.00	1.00		1.00	1.00	
Flt Protected		0.99					0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1655					1770	3539		1770	3532	
Flt Permitted		0.91					0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1533					1770	3539		1770	3532	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	0	145	0	0	0	68	1493	0	16	2942	42
RTOR Reduction (vph)	0	73	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	122	0	0	0	0	68	1493	0	16	2983	0
Turn Type	Perm	NA					Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		17.2					10.2	112.1		2.7	104.6	
Effective Green, g (s)		17.2					10.2	112.1		2.7	104.6	
Actuated g/C Ratio		0.12					0.07	0.77		0.02	0.72	
Clearance Time (s)		4.0					4.0	5.0		4.0	5.0	
Vehicle Extension (s)		3.0					3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		181					124	2736		32	2547	
v/s Ratio Prot							0.04	c0.42		0.01	c0.84	
v/s Ratio Perm		c0.08										
v/c Ratio		0.67					0.55	0.55		0.50	1.17	
Uniform Delay, d1		61.2					65.2	6.5		70.5	20.2	
Progression Factor		1.00					1.00	1.00		1.00	1.00	
Incremental Delay, d2		9.5					4.9	0.8		11.8	81.7	
Delay (s)		70.7					70.1	7.2		82.2	101.9	
Level of Service		E					E	A		F	F	
Approach Delay (s)		70.7			0.0			10.0			101.8	
Approach LOS		E			A			A			F	

Intersection Summary			
HCM 2000 Control Delay	70.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Attachment V

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↱	↱	↰	↑↑	↱	↰↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	550	113	650	36	388	288	542	1022	14	87	1822	934
Future Volume (vph)	550	113	650	36	388	288	542	1022	14	87	1822	934
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	5.0		4.0	5.0	
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.97	0.91		1.00	0.91	
Frt	1.00	0.89	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3013	1441	1770	3539	1583	3433	5075		1770	4827	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3013	1441	1770	3539	1583	3433	5075		1770	4827	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	598	123	707	39	422	313	589	1111	15	95	1980	1015
RTOR Reduction (vph)	0	180	180	0	0	170	0	1	0	0	54	0
Lane Group Flow (vph)	598	297	173	39	422	143	589	1125	0	95	2941	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	18.0	40.0	40.0	4.8	26.8	26.8	21.1	87.8		13.4	80.1	
Effective Green, g (s)	18.0	40.0	40.0	4.8	26.8	26.8	21.1	87.8		13.4	80.1	
Actuated g/C Ratio	0.11	0.25	0.25	0.03	0.16	0.16	0.13	0.54		0.08	0.49	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0		4.0	5.0	
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)	379	739	353	52	581	260	444	2733		145	2372	
v/s Ratio Prot	c0.17	0.10		0.02	c0.12		c0.17	0.22		0.05	c0.61	
v/s Ratio Perm			0.12			0.09						
v/c Ratio	1.58	0.40	0.49	0.75	0.73	0.55	1.33	0.41		0.66	1.24	
Uniform Delay, d1	72.5	51.5	52.7	78.5	64.6	62.5	71.0	22.3		72.6	41.5	
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	272.4	0.4	1.1	45.2	4.5	2.4	161.9	0.5		10.2	111.7	
Delay (s)	344.9	51.8	53.8	123.7	69.1	64.9	232.9	22.7		82.7	153.1	
Level of Service	F	D	D	F	E	E	F	C		F	F	
Approach Delay (s)		175.1			70.2			94.9			150.9	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM 2000 Control Delay	133.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	163.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	112.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

4: Mission Blvd/Mission Boulevard & Garin Avenue

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑↑	↱	↰	↑↑↑
Traffic Volume (vph)	28	289	1132	20	270	2313
Future Volume (vph)	28	289	1132	20	270	2313
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.7	3.7	4.9	4.9	3.7	4.9
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.91
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)	1770	1583	3539	1583	1770	5085
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	5085
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	314	1230	22	293	2514
RTOR Reduction (vph)	0	221	0	6	0	0
Lane Group Flow (vph)	30	93	1230	16	293	2514
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2		
Actuated Green, G (s)	16.2	16.2	39.6	39.6	23.9	67.2
Effective Green, g (s)	16.2	16.2	39.6	39.6	23.9	67.2
Actuated g/C Ratio	0.18	0.18	0.43	0.43	0.26	0.73
Clearance Time (s)	3.7	3.7	4.9	4.9	3.7	4.9
Vehicle Extension (s)	2.0	2.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	311	278	1523	681	459	3714
v/s Ratio Prot	0.02		c0.35		0.17	c0.49
v/s Ratio Perm		c0.06		0.01		
v/c Ratio	0.10	0.34	0.81	0.02	0.64	0.68
Uniform Delay, d1	31.8	33.2	22.9	15.1	30.2	6.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.3	4.7	0.1	2.1	1.0
Delay (s)	31.8	33.4	27.6	15.1	32.4	7.6
Level of Service	C	C	C	B	C	A
Approach Delay (s)	33.3		27.4			10.2
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	92.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	67.0%	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 (vph)	24	32	66	32	25	23	19	1101	20	60	2280	4
Future Volume (vph)	24	32	66	32	25	23	19	1101	20	60	2280	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6		3.6	3.6		4.2	5.2		4.2	5.2	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.93		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1675		1770	1728		1770	3530		1770	3538	
Flt Permitted	0.72	1.00		0.59	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1347	1675		1104	1728		1770	3530		1770	3538	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	35	72	35	27	25	21	1197	22	65	2478	4
RTOR Reduction (vph)	0	63	0	0	22	0	0	1	0	0	0	0
Lane Group Flow (vph)	26	44	0	35	30	0	21	1218	0	65	2482	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	11.9	11.9		11.9	11.9		3.6	62.7		7.4	66.5	
Effective Green, g (s)	11.9	11.9		11.9	11.9		3.6	62.7		7.4	66.5	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.04	0.66		0.08	0.70	
Clearance Time (s)	3.6	3.6		3.6	3.6		4.2	5.2		4.2	5.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	168	209		138	216		67	2329		137	2476	
v/s Ratio Prot		0.03			0.02		0.01	c0.35		0.04	c0.70	
v/s Ratio Perm	0.02			c0.03								
v/c Ratio	0.15	0.21		0.25	0.14		0.31	0.52		0.47	1.00	
Uniform Delay, d1	37.1	37.3		37.5	37.0		44.5	8.4		41.9	14.2	
Progression Factor	1.00	1.00		1.00	1.00		0.68	0.77		1.00	1.00	
Incremental Delay, d2	0.4	0.5		1.0	0.3		2.1	0.7		2.6	18.7	
Delay (s)	37.5	37.8		38.5	37.3		32.5	7.2		44.5	32.9	
Level of Service	D	D		D	D		C	A		D	C	
Approach Delay (s)		37.8			37.8			7.6			33.2	
Approach LOS		D			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Mission Boulevard & Fairway St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱			↰↑	↱	↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	176	103	25	216	46	76	1	894	42	23	2272	61
Future Volume (vph)	176	103	25	216	46	76	1	894	42	23	2272	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.6			3.6	3.6	4.2	5.2		4.2	5.2	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt		0.99			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1790			1789	1583	1770	3515		1770	3525	
Flt Permitted		0.51			0.59	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		941			1094	1583	1770	3515		1770	3525	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	191	112	27	235	50	83	1	972	46	25	2470	66
RTOR Reduction (vph)	0	3	0	0	0	54	0	3	0	0	2	0
Lane Group Flow (vph)	0	327	0	0	285	29	1	1015	0	25	2534	0
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		33.6			33.6	33.6	1.8	44.0		4.4	46.6	
Effective Green, g (s)		33.6			33.6	33.6	1.8	44.0		4.4	46.6	
Actuated g/C Ratio		0.35			0.35	0.35	0.02	0.46		0.05	0.49	
Clearance Time (s)		3.6			3.6	3.6	4.2	5.2		4.2	5.2	
Vehicle Extension (s)		2.0			2.0	2.0	2.0	4.5		2.0	4.6	
Lane Grp Cap (vph)		332			386	559	33	1628		81	1729	
v/s Ratio Prot							0.00	c0.29		0.01	c0.72	
v/s Ratio Perm		c0.35			0.26	0.02						
v/c Ratio		0.98			0.74	0.05	0.03	0.62		0.31	1.47	
Uniform Delay, d1		30.4			26.9	20.2	45.7	19.2		43.8	24.2	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.08	0.97	
Incremental Delay, d2		44.7			6.2	0.0	0.1	1.8		0.3	210.9	
Delay (s)		75.1			33.1	20.2	45.9	21.1		47.7	234.4	
Level of Service		E			C	C	D	C		D	F	
Approach Delay (s)		75.1			30.2			21.1			232.6	
Approach LOS		E			C			C			F	

Intersection Summary			
HCM 2000 Control Delay	152.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	95.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Arrowhead Way/Dixon St & Industrial Pkwy

Cumulative AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑		↰	↑↱		↰	↱			↰	↱
Traffic Volume (vph)	260	784	29	5	1764	151	119	38	19	487	43	687
Future Volume (vph)	260	784	29	5	1764	151	119	38	19	487	43	687
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.96	1.00
Satd. Flow (prot)	1770	3520		1770	3497		1770	1768			1781	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.19	1.00			0.70	1.00
Satd. Flow (perm)	1770	3520		1770	3497		350	1768			1302	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	283	852	32	5	1917	164	129	41	21	529	47	747
RTOR Reduction (vph)	0	2	0	0	7	0	0	16	0	0	0	199
Lane Group Flow (vph)	283	882	0	5	2074	0	129	46	0	0	576	548
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	14.7	51.9		1.1	38.3		21.3	21.3			21.3	21.3
Effective Green, g (s)	14.7	51.9		1.1	38.3		21.3	21.3			21.3	21.3
Actuated g/C Ratio	0.17	0.59		0.01	0.43		0.24	0.24			0.24	0.24
Clearance Time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	5.0
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	294	2068		22	1516		84	426			314	381
v/s Ratio Prot	c0.16	0.25		0.00	c0.59			0.03				
v/s Ratio Perm							0.37				c0.44	0.35
v/c Ratio	0.96	0.43		0.23	1.37		1.54	0.11			1.83	1.44
Uniform Delay, d1	36.5	10.0		43.2	25.0		33.5	26.1			33.5	33.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	41.9	0.3		1.9	169.8		291.8	0.0			387.7	211.9
Delay (s)	78.4	10.3		45.1	194.8		325.3	26.1			421.2	245.4
Level of Service	E	B		D	F		F	C			F	F
Approach Delay (s)		26.8			194.5			228.2			321.9	
Approach LOS		C			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	190.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.42		
Actuated Cycle Length (s)	88.3	Sum of lost time (s)	14.0
Intersection Capacity Utilization	115.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Attachment V

HCM Signalized Intersection Capacity Analysis
1: Mission Boulevard & Tennyson Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑	↱		↰↑	↱	↰↰	↑↑↑↱		↰	↑↑↑	↱
Traffic Volume (vph)	684	23	364	16	75	4	615	1695	2	112	1198	691
Future Volume (vph)	684	23	364	16	75	4	615	1695	2	112	1198	691
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0	4.0	4.0	5.0		4.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00		1.00	1.00	0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583		1847	1583	3433	5084		1770	5085	1583
Flt Permitted	0.95	1.00	1.00		0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583		1847	1583	3433	5084		1770	5085	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	743	25	396	17	82	4	668	1842	2	122	1302	751
RTOR Reduction (vph)	0	0	311	0	0	4	0	0	0	0	0	348
Lane Group Flow (vph)	743	25	85	0	99	0	668	1844	0	122	1302	403
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	3	3		4	4		1	6		5	2	
Permitted Phases			3			4						2
Actuated Green, G (s)	33.0	33.0	33.0		16.4	16.4	39.5	65.0		20.6	46.1	46.1
Effective Green, g (s)	33.0	33.0	33.0		16.4	16.4	39.5	65.0		20.6	46.1	46.1
Actuated g/C Ratio	0.22	0.22	0.22		0.11	0.11	0.26	0.42		0.13	0.30	0.30
Clearance Time (s)	5.0	5.0	5.0		4.0	4.0	4.0	5.0		4.0	5.0	5.0
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)	740	401	341		197	169	886	2159		238	1532	476
v/s Ratio Prot	c0.22	0.01			c0.05		c0.19	c0.36		0.07	0.26	
v/s Ratio Perm			0.05			0.00						0.25
v/c Ratio	1.00	0.06	0.25		0.50	0.00	0.75	0.85		0.51	0.85	0.85
Uniform Delay, d1	60.0	47.7	49.7		64.5	61.0	52.3	39.7		61.5	50.2	50.1
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.15	1.17		1.00	1.00	1.00
Incremental Delay, d2	34.1	0.1	0.4		2.0	0.0	2.5	3.2		1.9	6.1	16.8
Delay (s)	94.1	47.8	50.1		66.5	61.0	62.7	49.5		63.4	56.3	66.9
Level of Service	F	D	D		E	E	E	D		E	E	E
Approach Delay (s)		78.1			66.3			53.0			60.4	
Approach LOS		E			E			D			E	

Intersection Summary			
HCM 2000 Control Delay	60.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	153.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Mission Boulevard & Valle Vista

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✢			✢		↰	↑↱		↰	↑↱	
Traffic Volume (vph)	57	0	115	0	0	0	173	2053	0	13	1417	126
Future Volume (vph)	57	0	115	0	0	0	173	2053	0	13	1417	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	5.0		4.0	5.0	
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	
Frt		0.91					1.00	1.00		1.00	0.99	
Flt Protected		0.98					0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1667					1770	3539		1770	3496	
Flt Permitted		0.89					0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1507					1770	3539		1770	3496	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	0	125	0	0	0	188	2232	0	14	1540	137
RTOR Reduction (vph)	0	69	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	118	0	0	0	0	188	2232	0	14	1672	0
Turn Type	Perm	NA					Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		17.5					27.3	119.8		2.7	95.2	
Effective Green, g (s)		17.5					27.3	119.8		2.7	95.2	
Actuated g/C Ratio		0.11					0.18	0.78		0.02	0.62	
Clearance Time (s)		4.0					4.0	5.0		4.0	5.0	
Vehicle Extension (s)		3.0					3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		172					315	2771		31	2175	
v/s Ratio Prot							0.11	c0.63		0.01	c0.48	
v/s Ratio Perm		c0.08										
v/c Ratio		0.69					0.60	0.81		0.45	0.77	
Uniform Delay, d1		65.1					57.8	9.8		74.4	20.9	
Progression Factor		1.00					0.95	1.09		0.83	2.47	
Incremental Delay, d2		10.8					1.6	1.4		6.1	1.6	
Delay (s)		75.9					56.4	12.1		68.1	53.3	
Level of Service		E					E	B		E	D	
Approach Delay (s)		75.9			0.0			15.5			53.5	
Approach LOS		E			A			B			D	

Intersection Summary			
HCM 2000 Control Delay	33.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	153.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	82.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Mission Boulevard & Industrial Pkwy

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↱	↱	↰	↑↑	↱	↰↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	800	205	690	9	229	175	706	1655	26	104	966	321
Future Volume (vph)	800	205	690	9	229	175	706	1655	26	104	966	321
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	5.0		4.0	5.0	
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.97	0.91		1.00	0.91	
Frt	1.00	0.91	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3071	1441	1770	3539	1583	3433	5074		1770	4895	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3071	1441	1770	3539	1583	3433	5074		1770	4895	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	870	223	750	10	249	190	767	1799	28	113	1050	349
RTOR Reduction (vph)	0	201	201	0	0	165	0	1	0	0	41	0
Lane Group Flow (vph)	870	397	174	10	249	25	767	1826	0	113	1358	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	36.0	54.4	54.4	1.6	20.0	20.0	25.5	65.5		14.5	54.5	
Effective Green, g (s)	36.0	54.4	54.4	1.6	20.0	20.0	25.5	65.5		14.5	54.5	
Actuated g/C Ratio	0.24	0.36	0.36	0.01	0.13	0.13	0.17	0.43		0.09	0.36	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0		4.0	5.0	
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)	807	1091	512	18	462	206	572	2172		167	1743	
v/s Ratio Prot	c0.25	0.13		0.01	c0.07		c0.22	c0.36		0.06	c0.28	
v/s Ratio Perm			0.12			0.02						
v/c Ratio	1.08	0.36	0.34	0.56	0.54	0.12	1.34	0.84		0.68	0.78	
Uniform Delay, d1	58.5	36.5	36.1	75.3	62.2	58.7	63.8	39.1		67.0	43.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.05	1.47	
Incremental Delay, d2	54.9	0.2	0.4	32.3	1.2	0.3	164.9	4.1		7.7	2.6	
Delay (s)	113.4	36.7	36.5	107.6	63.4	59.0	228.7	43.2		77.8	67.0	
Level of Service	F	D	D	F	E	E	F	D		E	E	
Approach Delay (s)		72.9			62.5			98.1			67.8	
Approach LOS		E			E			F			E	

Intersection Summary			
HCM 2000 Control Delay	81.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	153.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Mission Blvd/Mission Boulevard & Garin Avenue

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑↑	↱	↰	↑↑↑
Traffic Volume (vph)	47	481	1892	33	364	1354
Future Volume (vph)	47	481	1892	33	364	1354
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.7	3.7	4.9	4.9	3.7	4.9
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.91
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)	1770	1583	3539	1583	1770	5085
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	5085
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	523	2057	36	396	1472
RTOR Reduction (vph)	0	199	0	7	0	0
Lane Group Flow (vph)	51	324	2057	29	396	1472
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2		
Actuated Green, G (s)	20.7	20.7	35.7	35.7	16.9	56.3
Effective Green, g (s)	20.7	20.7	35.7	35.7	16.9	56.3
Actuated g/C Ratio	0.24	0.24	0.42	0.42	0.20	0.66
Clearance Time (s)	3.7	3.7	4.9	4.9	3.7	4.9
Vehicle Extension (s)	2.0	2.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	428	382	1475	660	349	3344
v/s Ratio Prot	0.03		c0.58		c0.22	0.29
v/s Ratio Perm		c0.20		0.02		
v/c Ratio	0.12	0.85	1.39	0.04	1.13	0.44
Uniform Delay, d1	25.3	30.9	24.9	14.8	34.3	7.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	15.2	181.8	0.1	89.9	0.4
Delay (s)	25.4	46.2	206.7	14.9	124.2	7.5
Level of Service	C	D	F	B	F	A
Approach Delay (s)	44.3		203.4			32.2
Approach LOS	D		F			C

Intersection Summary			
HCM 2000 Control Delay	112.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	85.6	Sum of lost time (s)	12.3
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Mission Boulevard/Mission Blvd & Arrowhead Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↑↱		↰	↑↱	
Traffic Volume (vph)	13	17	35	39	29	101	60	1794	32	43	1344	24
Future Volume (vph)	13	17	35	39	29	101	60	1794	32	43	1344	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6		3.6	3.6		4.2	5.2		4.2	5.2	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.88		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1673		1770	1646		1770	3530		1770	3530	
Flt Permitted	0.50	1.00		0.72	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	940	1673		1342	1646		1770	3530		1770	3530	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	18	38	42	32	110	65	1950	35	47	1461	26
RTOR Reduction (vph)	0	32	0	0	94	0	0	1	0	0	1	0
Lane Group Flow (vph)	14	24	0	42	48	0	65	1984	0	47	1486	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	13.8	13.8		13.8	13.8		8.0	62.8		5.4	60.2	
Effective Green, g (s)	13.8	13.8		13.8	13.8		8.0	62.8		5.4	60.2	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.08	0.66		0.06	0.63	
Clearance Time (s)	3.6	3.6		3.6	3.6		4.2	5.2		4.2	5.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	136	243		194	239		149	2333		100	2236	
v/s Ratio Prot		0.01			0.03		0.04	c0.56		0.03	c0.42	
v/s Ratio Perm	0.01			c0.03								
v/c Ratio	0.10	0.10		0.22	0.20		0.44	0.85		0.47	0.66	
Uniform Delay, d1	35.2	35.2		35.8	35.7		41.4	12.5		43.4	11.0	
Progression Factor	1.00	1.00		1.00	1.00		0.83	1.32		1.00	1.00	
Incremental Delay, d2	0.3	0.2		0.6	0.4		0.2	0.4		3.5	1.6	
Delay (s)	35.6	35.4		36.4	36.2		34.7	16.9		46.9	12.6	
Level of Service	D	D		D	D		C	B		D	B	
Approach Delay (s)		35.4			36.2			17.4			13.6	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Mission Boulevard & Fairway St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			↰	↱	↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	212	332	44	64	50	15	20	1653	322	50	1285	102
Future Volume (vph)	212	332	44	64	50	15	20	1653	322	50	1285	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.6			3.6	3.6	4.2	5.2		4.2	5.2	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt		0.99			1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected		0.98			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1811			1812	1583	1770	3453		1770	3500	
Flt Permitted		0.81			0.60	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1489			1115	1583	1770	3453		1770	3500	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	230	361	48	70	54	16	22	1797	350	54	1397	111
RTOR Reduction (vph)	0	3	0	0	0	10	0	17	0	0	5	0
Lane Group Flow (vph)	0	636	0	0	124	6	22	2130	0	54	1503	0
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		34.0			34.0	34.0	3.6	39.1		8.9	44.4	
Effective Green, g (s)		34.0			34.0	34.0	3.6	39.1		8.9	44.4	
Actuated g/C Ratio		0.36			0.36	0.36	0.04	0.41		0.09	0.47	
Clearance Time (s)		3.6			3.6	3.6	4.2	5.2		4.2	5.2	
Vehicle Extension (s)		2.0			2.0	2.0	2.0	4.5		2.0	4.6	
Lane Grp Cap (vph)		532			399	566	67	1421		165	1635	
v/s Ratio Prot							0.01	c0.62		0.03	c0.43	
v/s Ratio Perm		c0.43			0.11	0.00						
v/c Ratio		1.20			0.31	0.01	0.33	1.50		0.33	0.92	
Uniform Delay, d1		30.5			22.0	19.7	44.5	27.9		40.3	23.6	
Progression Factor		1.00			1.00	1.00	1.00	1.00		0.97	0.87	
Incremental Delay, d2		105.1			0.2	0.0	1.0	228.2		0.3	8.1	
Delay (s)		135.6			22.2	19.7	45.6	256.2		39.4	28.7	
Level of Service		F			C	B	D	F		D	C	
Approach Delay (s)		135.6			21.9			254.1			29.1	
Approach LOS		F			C			F			C	

Intersection Summary			
HCM 2000 Control Delay	152.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.33		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	106.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Attachment V

HCM Signalized Intersection Capacity Analysis
7: Arrowhead Way/Dixon St & Industrial Pkwy

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑		↰	↑↱		↰	↱			↰	↱
Traffic Volume (vph)	672	1405	74	8	885	394	68	60	13	127	30	450
Future Volume (vph)	672	1405	74	8	885	394	68	60	13	127	30	450
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	1.00
Frt	1.00	0.99		1.00	0.95		1.00	0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.96	1.00
Satd. Flow (prot)	1770	3513		1770	3376		1770	1813			1790	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.57	1.00			0.71	1.00
Satd. Flow (perm)	1770	3513		1770	3376		1056	1813			1330	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	730	1527	80	9	962	428	74	65	14	138	33	489
RTOR Reduction (vph)	0	3	0	0	56	0	0	10	0	0	0	239
Lane Group Flow (vph)	730	1604	0	9	1334	0	74	69	0	0	171	250
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	15.1	52.6		1.1	38.6		16.6	16.6			16.6	16.6
Effective Green, g (s)	15.1	52.6		1.1	38.6		16.6	16.6			16.6	16.6
Actuated g/C Ratio	0.18	0.62		0.01	0.46		0.20	0.20			0.20	0.20
Clearance Time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	5.0
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	317	2191		23	1545		207	357			261	311
v/s Ratio Prot	c0.41	0.46		0.01	c0.40			0.04				
v/s Ratio Perm							0.07				0.13	c0.16
v/c Ratio	2.30	0.73		0.39	0.86		0.36	0.19			0.66	0.80
Uniform Delay, d1	34.6	11.0		41.3	20.5		29.2	28.3			31.2	32.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	596.1	1.6		4.0	5.7		0.4	0.1			4.5	13.1
Delay (s)	630.7	12.5		45.2	26.2		29.6	28.4			35.7	45.4
Level of Service	F	B		D	C		C	C			D	D
Approach Delay (s)		205.6			26.4			29.0			42.9	
Approach LOS		F			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	121.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	84.3	Sum of lost time (s)	14.0
Intersection Capacity Utilization	101.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX E: CUMULATIVE 2035 PLUS PROJECT LEVEL OF SERVICE WORKSHEETS

HCM Signalized Intersection Capacity Analysis
1: Mission Boulevard & Tennyson Road

Cumulative + Project AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑	↱		↰	↱	↰↰	↑↑↱		↰	↑↑↑	↱
Traffic Volume (vph)	624	17	450	65	80	10	305	1302	0	35	2248	555
Future Volume (vph)	624	17	450	65	80	10	305	1302	0	35	2248	555
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0	4.0	4.0	5.0		4.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00		1.00	1.00	0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583		1822	1583	3433	5085		1770	5085	1583
Flt Permitted	0.95	1.00	1.00		0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583		1822	1583	3433	5085		1770	5085	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	678	18	489	71	87	11	332	1415	0	38	2443	603
RTOR Reduction (vph)	0	0	265	0	0	10	0	0	0	0	0	158
Lane Group Flow (vph)	678	18	224	0	158	1	332	1415	0	38	2443	445
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	3	3		4	4		1	6		5	2	
Permitted Phases			3			4						2
Actuated Green, G (s)	32.3	32.3	32.3		19.6	19.6	23.1	67.7		6.4	51.0	51.0
Effective Green, g (s)	32.3	32.3	32.3		19.6	19.6	23.1	67.7		6.4	51.0	51.0
Actuated g/C Ratio	0.22	0.22	0.22		0.14	0.14	0.16	0.47		0.04	0.35	0.35
Clearance Time (s)	5.0	5.0	5.0		4.0	4.0	4.0	5.0		4.0	5.0	5.0
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)	770	417	355		247	215	550	2390		78	1800	560
v/s Ratio Prot	c0.20	0.01			c0.09		c0.10	0.28		0.02	c0.48	
v/s Ratio Perm			0.14			0.00						0.28
v/c Ratio	0.88	0.04	0.63		0.64	0.01	0.60	0.59		0.49	1.36	0.79
Uniform Delay, d1	54.0	43.7	50.5		58.9	53.8	56.2	28.0		67.2	46.5	41.8
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	11.5	0.0	3.6		5.4	0.0	1.9	1.1		4.7	164.5	11.1
Delay (s)	65.5	43.8	54.1		64.2	53.8	58.1	29.1		71.9	211.0	52.9
Level of Service	E	D	D		E	D	E	C		E	F	D
Approach Delay (s)		60.4			63.5			34.6			178.3	
Approach LOS		E			E			C			F	

Intersection Summary			
HCM 2000 Control Delay	112.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	144.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
Cumulative + Project AM

2: Mission Boulevard & Valle Vista

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣		↰	↑↱		↰	↑↱	
Traffic Volume (vph)	46	0	144	0	0	0	87	1428	0	15	2707	39
Future Volume (vph)	46	0	144	0	0	0	87	1428	0	15	2707	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	5.0		4.0	5.0	
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	
Frt		0.90					1.00	1.00		1.00	1.00	
Flt Protected		0.99					0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1652					1770	3539		1770	3532	
Flt Permitted		0.92					0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1538					1770	3539		1770	3532	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	0	157	0	0	0	95	1552	0	16	2942	42
RTOR Reduction (vph)	0	73	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	134	0	0	0	0	95	1552	0	16	2983	0
Turn Type	Perm	NA					Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		18.0					10.4	111.3		2.7	103.6	
Effective Green, g (s)		18.0					10.4	111.3		2.7	103.6	
Actuated g/C Ratio		0.12					0.07	0.77		0.02	0.71	
Clearance Time (s)		4.0					4.0	5.0		4.0	5.0	
Vehicle Extension (s)		3.0					3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		190					126	2716		32	2523	
v/s Ratio Prot							c0.05	0.44		0.01	c0.84	
v/s Ratio Perm		c0.09										
v/c Ratio		0.71					0.75	0.57		0.50	1.18	
Uniform Delay, d1		61.0					66.0	7.0		70.5	20.7	
Progression Factor		1.00					1.00	1.00		1.00	1.00	
Incremental Delay, d2		11.4					22.2	0.9		11.8	86.5	
Delay (s)		72.3					88.3	7.9		82.2	107.2	
Level of Service		E					F	A		F	F	
Approach Delay (s)		72.3			0.0			12.5			107.1	
Approach LOS		E			A			B			F	

Intersection Summary			
HCM 2000 Control Delay	73.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

3: Mission Boulevard & Industrial Pkwy

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↱	↱	↰	↑↑	↱	↰↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	563	113	650	36	388	288	542	1033	14	117	1837	960
Future Volume (vph)	563	113	650	36	388	288	542	1033	14	117	1837	960
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	5.0		4.0	5.0	
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.97	0.91		1.00	0.91	
Frt	1.00	0.89	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3013	1441	1770	3539	1583	3433	5075		1770	4824	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3013	1441	1770	3539	1583	3433	5075		1770	4824	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	612	123	707	39	422	313	589	1123	15	127	1997	1043
RTOR Reduction (vph)	0	183	183	0	0	180	0	1	0	0	58	0
Lane Group Flow (vph)	612	294	170	39	422	133	589	1137	0	127	2982	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	22.0	40.5	40.5	4.8	23.3	23.3	22.0	84.4		16.3	78.7	
Effective Green, g (s)	22.0	40.5	40.5	4.8	23.3	23.3	22.0	84.4		16.3	78.7	
Actuated g/C Ratio	0.13	0.25	0.25	0.03	0.14	0.14	0.13	0.52		0.10	0.48	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0		4.0	5.0	
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)	463	748	358	52	505	226	463	2627		177	2329	
v/s Ratio Prot	c0.18	0.10		0.02	c0.12		c0.17	0.22		0.07	c0.62	
v/s Ratio Perm			0.12			0.08						
v/c Ratio	1.32	0.39	0.48	0.75	0.84	0.59	1.27	0.43		0.72	1.28	
Uniform Delay, d1	70.5	51.0	52.2	78.5	68.0	65.4	70.5	24.4		71.1	42.1	
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	159.3	0.3	1.0	45.2	11.4	3.9	138.5	0.5		13.0	129.6	
Delay (s)	229.8	51.4	53.2	123.7	79.4	69.2	209.0	24.9		84.1	171.8	
Level of Service	F	D	D	F	E	E	F	C		F	F	
Approach Delay (s)		127.6			77.5			87.7			168.3	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM 2000 Control Delay	130.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	163.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	113.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

4: Mission Blvd/Mission Boulevard & Garin Avenue

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑↑	↱	↰	↑↑↑
Traffic Volume (vph)	28	289	1143	20	270	2328
Future Volume (vph)	28	289	1143	20	270	2328
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.7	3.7	4.9	4.9	3.7	4.9
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.91
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)	1770	1583	3539	1583	1770	5085
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	5085
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	314	1242	22	293	2530
RTOR Reduction (vph)	0	220	0	6	0	0
Lane Group Flow (vph)	30	94	1242	16	293	2530
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2		
Actuated Green, G (s)	16.2	16.2	39.6	39.6	23.9	67.2
Effective Green, g (s)	16.2	16.2	39.6	39.6	23.9	67.2
Actuated g/C Ratio	0.18	0.18	0.43	0.43	0.26	0.73
Clearance Time (s)	3.7	3.7	4.9	4.9	3.7	4.9
Vehicle Extension (s)	2.0	2.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	311	278	1523	681	459	3714
v/s Ratio Prot	0.02		c0.35		0.17	c0.50
v/s Ratio Perm		c0.06		0.01		
v/c Ratio	0.10	0.34	0.82	0.02	0.64	0.68
Uniform Delay, d1	31.8	33.2	23.0	15.1	30.2	6.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.3	4.9	0.1	2.1	1.0
Delay (s)	31.8	33.5	27.9	15.1	32.4	7.7
Level of Service	C	C	C	B	C	A
Approach Delay (s)	33.3		27.7			10.2
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	92.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	67.3%	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 (vph)	24	32	66	32	25	23	19	1112	20	60	2295	4
Future Volume (vph)	24	32	66	32	25	23	19	1112	20	60	2295	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6		3.6	3.6		4.2	5.2		4.2	5.2	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.93		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1675		1770	1728		1770	3530		1770	3538	
Flt Permitted	0.72	1.00		0.59	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1347	1675		1104	1728		1770	3530		1770	3538	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	35	72	35	27	25	21	1209	22	65	2495	4
RTOR Reduction (vph)	0	63	0	0	22	0	0	1	0	0	0	0
Lane Group Flow (vph)	26	44	0	35	30	0	21	1230	0	65	2499	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	11.9	11.9		11.9	11.9		3.6	62.7		7.4	66.5	
Effective Green, g (s)	11.9	11.9		11.9	11.9		3.6	62.7		7.4	66.5	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.04	0.66		0.08	0.70	
Clearance Time (s)	3.6	3.6		3.6	3.6		4.2	5.2		4.2	5.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	168	209		138	216		67	2329		137	2476	
v/s Ratio Prot		0.03			0.02		0.01	c0.35		0.04	c0.71	
v/s Ratio Perm	0.02			c0.03								
v/c Ratio	0.15	0.21		0.25	0.14		0.31	0.53		0.47	1.01	
Uniform Delay, d1	37.1	37.3		37.5	37.0		44.5	8.4		41.9	14.2	
Progression Factor	1.00	1.00		1.00	1.00		0.69	0.79		1.00	1.00	
Incremental Delay, d2	0.4	0.5		1.0	0.3		2.1	0.7		2.6	20.4	
Delay (s)	37.5	37.8		38.5	37.3		32.9	7.3		44.5	34.6	
Level of Service	D	D		D	D		C	A		D	C	
Approach Delay (s)		37.8			37.8			7.8			34.9	
Approach LOS		D			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	79.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Mission Boulevard & Fairway St

Cumulative + Project AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱			↰↑	↱	↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	176	103	25	216	46	76	1	905	42	23	2287	61
Future Volume (vph)	176	103	25	216	46	76	1	905	42	23	2287	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.6			3.6	3.6	4.2	5.2		4.2	5.2	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt		0.99			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1790			1789	1583	1770	3516		1770	3525	
Flt Permitted		0.51			0.59	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		941			1094	1583	1770	3516		1770	3525	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	191	112	27	235	50	83	1	984	46	25	2486	66
RTOR Reduction (vph)	0	3	0	0	0	54	0	3	0	0	2	0
Lane Group Flow (vph)	0	327	0	0	285	29	1	1027	0	25	2550	0
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		33.6			33.6	33.6	1.8	44.0		4.4	46.6	
Effective Green, g (s)		33.6			33.6	33.6	1.8	44.0		4.4	46.6	
Actuated g/C Ratio		0.35			0.35	0.35	0.02	0.46		0.05	0.49	
Clearance Time (s)		3.6			3.6	3.6	4.2	5.2		4.2	5.2	
Vehicle Extension (s)		2.0			2.0	2.0	2.0	4.5		2.0	4.6	
Lane Grp Cap (vph)		332			386	559	33	1628		81	1729	
v/s Ratio Prot							0.00	c0.29		0.01	c0.72	
v/s Ratio Perm		c0.35			0.26	0.02						
v/c Ratio		0.98			0.74	0.05	0.03	0.63		0.31	1.48	
Uniform Delay, d1		30.4			26.9	20.2	45.7	19.3		43.8	24.2	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.08	0.97	
Incremental Delay, d2		44.7			6.2	0.0	0.1	1.9		0.3	215.0	
Delay (s)		75.1			33.1	20.2	45.9	21.2		47.7	238.5	
Level of Service		E			C	C	D	C		D	F	
Approach Delay (s)		75.1			30.2			21.2			236.6	
Approach LOS		E			C			C			F	

Intersection Summary			
HCM 2000 Control Delay	155.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	96.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Arrowhead Way/Dixon St & Industrial Pkwy

Cumulative + Project AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑		↰	↑↱		↰	↱			↰	↱
Traffic Volume (vph)	267	797	29	5	1790	155	119	38	19	487	43	687
Future Volume (vph)	267	797	29	5	1790	155	119	38	19	487	43	687
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.96	1.00
Satd. Flow (prot)	1770	3520		1770	3497		1770	1768			1781	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.19	1.00			0.70	1.00
Satd. Flow (perm)	1770	3520		1770	3497		350	1768			1302	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	290	866	32	5	1946	168	129	41	21	529	47	747
RTOR Reduction (vph)	0	2	0	0	7	0	0	16	0	0	0	199
Lane Group Flow (vph)	290	896	0	5	2107	0	129	46	0	0	576	548
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	14.8	52.1		1.1	38.4		21.3	21.3			21.3	21.3
Effective Green, g (s)	14.8	52.1		1.1	38.4		21.3	21.3			21.3	21.3
Actuated g/C Ratio	0.17	0.59		0.01	0.43		0.24	0.24			0.24	0.24
Clearance Time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	5.0
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	296	2072		22	1517		84	425			313	380
v/s Ratio Prot	c0.16	0.25		0.00	c0.60			0.03				
v/s Ratio Perm							0.37				c0.44	0.35
v/c Ratio	0.98	0.43		0.23	1.39		1.54	0.11			1.84	1.44
Uniform Delay, d1	36.7	10.0		43.3	25.1		33.6	26.2			33.6	33.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	46.0	0.3		1.9	179.1		291.8	0.0			390.3	213.4
Delay (s)	82.7	10.3		45.2	204.1		325.4	26.2			423.9	247.0
Level of Service	F	B		D	F		F	C			F	F
Approach Delay (s)		28.0			203.7			228.3			324.0	
Approach LOS		C			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	194.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.44		
Actuated Cycle Length (s)	88.5	Sum of lost time (s)	14.0
Intersection Capacity Utilization	116.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Attachment V

HCM Unsignalized Intersection Capacity Analysis
28: Mission Boulevard & South Driveway

Cumulative + Project AM

	↗	↘	↖	↑	↓	↙
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑↑	↑↑↱	
Traffic Volume (veh/h)	0	45	0	1776	2835	34
Future Volume (Veh/h)	0	45	0	1776	2835	34
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	49	0	1930	3082	37
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				431		
pX, platoon unblocked	0.85					
vC, conflicting volume	4066	1046	3119			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	4260	1046	3119			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	78	100			
cM capacity (veh/h)	1	225	101			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	49	965	965	1233	1233	653
Volume Left	0	0	0	0	0	0
Volume Right	49	0	0	0	0	37
cSH	225	1700	1700	1700	1700	1700
Volume to Capacity	0.22	0.57	0.57	0.73	0.73	0.38
Queue Length 95th (ft)	20	0	0	0	0	0
Control Delay (s)	25.4	0.0	0.0	0.0	0.0	0.0
Lane LOS	D					
Approach Delay (s)	25.4	0.0		0.0		
Approach LOS	D					

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		

31: Mission Boulevard & North Driveway

	↗	↘	↖	↑	↓	↙
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑↑	↑↱	
Traffic Volume (veh/h)	0	30	0	1776	2869	22
Future Volume (Veh/h)	0	30	0	1776	2869	22
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	33	0	1930	3118	24
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				577	1214	
pX, platoon unblocked	0.38	0.30	0.30			
vC, conflicting volume	4095	1571	3142			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	4008	0	3474			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	90	100			
cM capacity (veh/h)	1	325	22			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	33	965	965	2079	1063
Volume Left	0	0	0	0	0
Volume Right	33	0	0	0	24
cSH	325	1700	1700	1700	1700
Volume to Capacity	0.10	0.57	0.57	1.22	0.63
Queue Length 95th (ft)	8	0	0	0	0
Control Delay (s)	17.3	0.0	0.0	0.0	0.0
Lane LOS	C				
Approach Delay (s)	17.3	0.0		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
3: Mission Boulevard & Industrial Pkwy

Cumulative + Project AM Mitigation

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↱	↱	↰	↑↑	↱	↰↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	563	113	650	36	388	288	542	1033	14	117	1837	960
Future Volume (vph)	563	113	650	36	388	288	542	1033	14	117	1837	960
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	5.0		4.0	5.0	
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.97	0.91		1.00	0.91	
Frt	1.00	0.89	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3013	1441	1770	3539	1583	3433	5075		1770	4824	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3013	1441	1770	3539	1583	3433	5075		1770	4824	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	612	123	707	39	422	313	589	1123	15	127	1997	1043
RTOR Reduction (vph)	0	183	183	0	0	180	0	1	0	0	58	0
Lane Group Flow (vph)	612	294	170	39	422	133	589	1137	0	127	2982	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	22.0	40.5	40.5	4.8	23.3	23.3	22.0	84.4		16.3	78.7	
Effective Green, g (s)	22.0	40.5	40.5	4.8	23.3	23.3	22.0	84.4		16.3	78.7	
Actuated g/C Ratio	0.13	0.25	0.25	0.03	0.14	0.14	0.13	0.52		0.10	0.48	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0		4.0	5.0	
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)	463	748	358	52	505	226	463	2627		177	2329	
v/s Ratio Prot	c0.18	0.10		0.02	c0.12		c0.17	0.22		0.07	c0.62	
v/s Ratio Perm			0.12			0.08						
v/c Ratio	1.32	0.39	0.48	0.75	0.84	0.59	1.27	0.43		0.72	1.28	
Uniform Delay, d1	70.5	51.0	52.2	78.5	68.0	65.4	70.5	24.4		71.1	42.1	
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	159.3	0.3	1.0	45.2	11.4	3.9	138.5	0.5		13.0	129.6	
Delay (s)	229.8	51.4	53.2	123.7	79.4	69.2	209.0	24.9		84.1	171.8	
Level of Service	F	D	D	F	E	E	F	C		F	F	
Approach Delay (s)		127.6			77.5			87.7			168.3	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM 2000 Control Delay	130.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	163.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	113.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: Mission Boulevard & Tennyson Road

Cumulative Plus Project PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑	↱		↰↑	↱	↰↰	↑↑↑↱		↰	↑↑↑	↱
Traffic Volume (vph)	684	23	375	16	75	4	624	1704	2	112	1209	691
Future Volume (vph)	684	23	375	16	75	4	624	1704	2	112	1209	691
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0	4.0	4.0	5.0		4.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00		1.00	1.00	0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583		1847	1583	3433	5084		1770	5085	1583
Flt Permitted	0.95	1.00	1.00		0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583		1847	1583	3433	5084		1770	5085	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	743	25	408	17	82	4	678	1852	2	122	1314	751
RTOR Reduction (vph)	0	0	320	0	0	4	0	0	0	0	0	404
Lane Group Flow (vph)	743	25	88	0	99	0	678	1854	0	122	1314	347
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	3	3		4	4		1	6		5	2	
Permitted Phases			3			4						2
Actuated Green, G (s)	33.0	33.0	33.0		16.4	16.4	39.6	65.0		20.6	46.0	46.0
Effective Green, g (s)	33.0	33.0	33.0		16.4	16.4	39.6	65.0		20.6	46.0	46.0
Actuated g/C Ratio	0.22	0.22	0.22		0.11	0.11	0.26	0.42		0.13	0.30	0.30
Clearance Time (s)	5.0	5.0	5.0		4.0	4.0	4.0	5.0		4.0	5.0	5.0
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)	740	401	341		197	169	888	2159		238	1528	475
v/s Ratio Prot	c0.22	0.01			c0.05		c0.20	c0.36		0.07	0.26	
v/s Ratio Perm			0.06			0.00						0.22
v/c Ratio	1.00	0.06	0.26		0.50	0.00	0.76	0.86		0.51	0.86	0.73
Uniform Delay, d1	60.0	47.7	49.8		64.5	61.0	52.4	39.8		61.5	50.5	47.9
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.15	1.18		1.00	1.00	1.00
Incremental Delay, d2	34.1	0.1	0.4		2.0	0.0	2.6	3.1		1.9	6.6	9.5
Delay (s)	94.1	47.8	50.2		66.5	61.0	62.9	50.0		63.4	57.0	57.4
Level of Service	F	D	D		E	E	E	D		E	E	E
Approach Delay (s)		77.9			66.3			53.5			57.5	
Approach LOS		E			E			D			E	

Intersection Summary			
HCM 2000 Control Delay	59.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	153.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
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 (vph)	57	0	124	0	0	0	197	2094	0	13	1417	126
Future Volume (vph)	57	0	124	0	0	0	197	2094	0	13	1417	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	5.0		4.0	5.0	
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	
Frt		0.91					1.00	1.00		1.00	0.99	
Flt Protected		0.98					0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1664					1770	3539		1770	3496	
Flt Permitted		0.89					0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1511					1770	3539		1770	3496	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	0	135	0	0	0	214	2276	0	14	1540	137
RTOR Reduction (vph)	0	69	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	128	0	0	0	0	214	2276	0	14	1672	0
Turn Type	Perm	NA					Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		18.3					25.8	119.0		2.7	95.9	
Effective Green, g (s)		18.3					25.8	119.0		2.7	95.9	
Actuated g/C Ratio		0.12					0.17	0.78		0.02	0.63	
Clearance Time (s)		4.0					4.0	5.0		4.0	5.0	
Vehicle Extension (s)		3.0					3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		180					298	2752		31	2191	
v/s Ratio Prot							0.12	c0.64		0.01	c0.48	
v/s Ratio Perm		c0.08										
v/c Ratio		0.71					0.72	0.83		0.45	0.76	
Uniform Delay, d1		64.8					60.2	10.6		74.4	20.4	
Progression Factor		1.00					0.94	1.17		0.86	2.47	
Incremental Delay, d2		12.5					3.6	1.3		6.0	1.5	
Delay (s)		77.4					60.5	13.8		69.6	51.9	
Level of Service		E					E	B		E	D	
Approach Delay (s)		77.4			0.0			17.8			52.0	
Approach LOS		E			A			B			D	

Intersection Summary			
HCM 2000 Control Delay	33.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	153.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Attachment V

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↱	↱	↰	↑↑	↱	↰↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	813	205	690	9	229	175	706	1666	26	122	975	337
Future Volume (vph)	813	205	690	9	229	175	706	1666	26	122	975	337
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	5.0		4.0	5.0	
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.97	0.91		1.00	0.91	
Frt	1.00	0.91	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3071	1441	1770	3539	1583	3433	5074		1770	4890	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3071	1441	1770	3539	1583	3433	5074		1770	4890	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	884	223	750	10	249	190	767	1811	28	133	1060	366
RTOR Reduction (vph)	0	200	200	0	0	165	0	1	0	0	42	0
Lane Group Flow (vph)	884	398	175	10	249	25	767	1838	0	133	1384	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	36.0	54.4	54.4	1.6	20.0	20.0	24.7	64.5		15.5	55.3	
Effective Green, g (s)	36.0	54.4	54.4	1.6	20.0	20.0	24.7	64.5		15.5	55.3	
Actuated g/C Ratio	0.24	0.36	0.36	0.01	0.13	0.13	0.16	0.42		0.10	0.36	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0		4.0	5.0	
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)	807	1091	512	18	462	206	554	2139		179	1767	
v/s Ratio Prot	c0.26	0.13		0.01	c0.07		c0.22	c0.36		0.08	c0.28	
v/s Ratio Perm			0.12			0.02						
v/c Ratio	1.10	0.36	0.34	0.56	0.54	0.12	1.38	0.86		0.74	0.78	
Uniform Delay, d1	58.5	36.5	36.2	75.3	62.2	58.7	64.2	40.1		66.8	43.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.05	1.46	
Incremental Delay, d2	61.0	0.2	0.4	32.3	1.2	0.3	184.0	4.8		11.3	2.6	
Delay (s)	119.5	36.7	36.6	107.6	63.4	59.0	248.2	44.9		81.7	66.1	
Level of Service	F	D	D	F	E	E	F	D		F	E	
Approach Delay (s)		76.1			62.5			104.7			67.4	
Approach LOS		E			E			F			E	

Intersection Summary			
HCM 2000 Control Delay	84.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	153.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

Cumulative Plus Project PM

4: Mission Blvd/Mission Boulevard & Garin Avenue

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑↑	↱	↰	↑↑↑
Traffic Volume (vph)	47	481	1903	33	364	1363
Future Volume (vph)	47	481	1903	33	364	1363
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.7	3.7	4.9	4.9	3.7	4.9
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.91
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)	1770	1583	3539	1583	1770	5085
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	5085
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	523	2068	36	396	1482
RTOR Reduction (vph)	0	199	0	7	0	0
Lane Group Flow (vph)	51	324	2068	29	396	1482
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2		
Actuated Green, G (s)	20.7	20.7	35.7	35.7	16.9	56.3
Effective Green, g (s)	20.7	20.7	35.7	35.7	16.9	56.3
Actuated g/C Ratio	0.24	0.24	0.42	0.42	0.20	0.66
Clearance Time (s)	3.7	3.7	4.9	4.9	3.7	4.9
Vehicle Extension (s)	2.0	2.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	428	382	1475	660	349	3344
v/s Ratio Prot	0.03		c0.58		c0.22	0.29
v/s Ratio Perm		c0.20		0.02		
v/c Ratio	0.12	0.85	1.40	0.04	1.13	0.44
Uniform Delay, d1	25.3	30.9	24.9	14.8	34.3	7.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	15.2	185.1	0.1	89.9	0.4
Delay (s)	25.4	46.2	210.0	14.9	124.2	7.5
Level of Service	C	D	F	B	F	A
Approach Delay (s)	44.3		206.7			32.1
Approach LOS	D		F			C

Intersection Summary			
HCM 2000 Control Delay	114.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	85.6	Sum of lost time (s)	12.3
Intersection Capacity Utilization	93.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

5: Mission Boulevard/Mission Blvd & Arrowhead Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↑↱		↰	↑↱	
Traffic Volume (vph)	13	17	35	39	29	101	60	1805	32	43	1353	24
Future Volume (vph)	13	17	35	39	29	101	60	1805	32	43	1353	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6		3.6	3.6		4.2	5.2		4.2	5.2	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.88		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1673		1770	1646		1770	3530		1770	3530	
Flt Permitted	0.50	1.00		0.72	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	940	1673		1342	1646		1770	3530		1770	3530	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	18	38	42	32	110	65	1962	35	47	1471	26
RTOR Reduction (vph)	0	32	0	0	94	0	0	1	0	0	1	0
Lane Group Flow (vph)	14	24	0	42	48	0	65	1996	0	47	1496	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	13.8	13.8		13.8	13.8		8.0	62.8		5.4	60.2	
Effective Green, g (s)	13.8	13.8		13.8	13.8		8.0	62.8		5.4	60.2	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.08	0.66		0.06	0.63	
Clearance Time (s)	3.6	3.6		3.6	3.6		4.2	5.2		4.2	5.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	136	243		194	239		149	2333		100	2236	
v/s Ratio Prot		0.01			0.03		0.04	c0.57		0.03	c0.42	
v/s Ratio Perm	0.01			c0.03								
v/c Ratio	0.10	0.10		0.22	0.20		0.44	0.86		0.47	0.67	
Uniform Delay, d1	35.2	35.2		35.8	35.7		41.4	12.6		43.4	11.1	
Progression Factor	1.00	1.00		1.00	1.00		0.83	1.33		1.00	1.00	
Incremental Delay, d2	0.3	0.2		0.6	0.4		0.2	0.4		3.5	1.6	
Delay (s)	35.6	35.4		36.4	36.2		34.6	17.1		46.9	12.7	
Level of Service	D	D		D	D		C	B		D	B	
Approach Delay (s)		35.4			36.2			17.7			13.7	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	69.4%	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 (vph)	212	332	44	64	50	15	20	1664	322	50	1294	102
Future Volume (vph)	212	332	44	64	50	15	20	1664	322	50	1294	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.6			3.6	3.6	4.2	5.2		4.2	5.2	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt		0.99			1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected		0.98			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1811			1812	1583	1770	3453		1770	3500	
Flt Permitted		0.81			0.60	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1489			1115	1583	1770	3453		1770	3500	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	230	361	48	70	54	16	22	1809	350	54	1407	111
RTOR Reduction (vph)	0	3	0	0	0	10	0	17	0	0	5	0
Lane Group Flow (vph)	0	636	0	0	124	6	22	2142	0	54	1513	0
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		34.0			34.0	34.0	3.6	39.1		8.9	44.4	
Effective Green, g (s)		34.0			34.0	34.0	3.6	39.1		8.9	44.4	
Actuated g/C Ratio		0.36			0.36	0.36	0.04	0.41		0.09	0.47	
Clearance Time (s)		3.6			3.6	3.6	4.2	5.2		4.2	5.2	
Vehicle Extension (s)		2.0			2.0	2.0	2.0	4.5		2.0	4.6	
Lane Grp Cap (vph)		532			399	566	67	1421		165	1635	
v/s Ratio Prot							0.01	c0.62		0.03	c0.43	
v/s Ratio Perm		c0.43			0.11	0.00						
v/c Ratio		1.20			0.31	0.01	0.33	1.51		0.33	0.93	
Uniform Delay, d1		30.5			22.0	19.7	44.5	27.9		40.3	23.7	
Progression Factor		1.00			1.00	1.00	1.00	1.00		0.97	0.87	
Incremental Delay, d2		105.1			0.2	0.0	1.0	232.0		0.3	8.6	
Delay (s)		135.6			22.2	19.7	45.6	260.0		39.4	29.2	
Level of Service		F			C	B	D	F		D	C	
Approach Delay (s)		135.6			21.9			257.8			29.6	
Approach LOS		F			C			F			C	

Intersection Summary			
HCM 2000 Control Delay	154.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.33		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	106.6%	ICU Level of Service	G
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 (vph)	679	1418	74	8	901	396	68	60	13	127	30	450
Future Volume (vph)	679	1418	74	8	901	396	68	60	13	127	30	450
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	1.00
Frt	1.00	0.99		1.00	0.95		1.00	0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.96	1.00
Satd. Flow (prot)	1770	3513		1770	3377		1770	1813			1790	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.57	1.00			0.71	1.00
Satd. Flow (perm)	1770	3513		1770	3377		1057	1813			1330	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	738	1541	80	9	979	430	74	65	14	138	33	489
RTOR Reduction (vph)	0	3	0	0	55	0	0	10	0	0	0	237
Lane Group Flow (vph)	738	1618	0	9	1354	0	74	69	0	0	171	252
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	15.1	52.5		1.1	38.5		16.7	16.7			16.7	16.7
Effective Green, g (s)	15.1	52.5		1.1	38.5		16.7	16.7			16.7	16.7
Actuated g/C Ratio	0.18	0.62		0.01	0.46		0.20	0.20			0.20	0.20
Clearance Time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	5.0
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	317	2187		23	1542		209	359			263	313
v/s Ratio Prot	c0.42	0.46		0.01	c0.40			0.04				
v/s Ratio Perm							0.07				0.13	c0.16
v/c Ratio	2.33	0.74		0.39	0.88		0.35	0.19			0.65	0.80
Uniform Delay, d1	34.6	11.1		41.3	20.8		29.1	28.2			31.1	32.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	607.4	1.6		4.0	6.5		0.4	0.1			4.3	13.1
Delay (s)	642.0	12.8		45.2	27.3		29.5	28.3			35.4	45.4
Level of Service	F	B		D	C		C	C			D	D
Approach Delay (s)		209.6			27.4			28.9			42.8	
Approach LOS		F			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	123.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	84.3	Sum of lost time (s)	14.0
Intersection Capacity Utilization	102.1%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑↑	↑↑↱	
Traffic Volume (veh/h)	0	27	0	2510	1486	33
Future Volume (Veh/h)	0	27	0	2510	1486	33
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	29	0	2728	1615	36
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				431		
pX, platoon unblocked	0.64					
vC, conflicting volume	2997	556	1651			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2995	556	1651			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	94	100			
cM capacity (veh/h)	7	474	387			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	29	1364	1364	646	646	359
Volume Left	0	0	0	0	0	0
Volume Right	29	0	0	0	0	36
cSH	474	1700	1700	1700	1700	1700
Volume to Capacity	0.06	0.80	0.80	0.38	0.38	0.21
Queue Length 95th (ft)	5	0	0	0	0	0
Control Delay (s)	13.1	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	13.1	0.0		0.0		
Approach LOS	B					

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
31: Mission Boulevard & North Driveway

	↗	↘	↖	↑	↓	↙
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑↑	↑↑↱	
Traffic Volume (veh/h)	0	18	0	2510	1519	22
Future Volume (Veh/h)	0	18	0	2510	1519	22
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	20	0	2728	1651	24
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				577	1214	
pX, platoon unblocked	0.73	0.79	0.79			
vC, conflicting volume	3027	562	1675			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1280	0	903			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	100			
cM capacity (veh/h)	115	852	588			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	20	1364	1364	660	660	354
Volume Left	0	0	0	0	0	0
Volume Right	20	0	0	0	0	24
cSH	852	1700	1700	1700	1700	1700
Volume to Capacity	0.02	0.80	0.80	0.39	0.39	0.21
Queue Length 95th (ft)	2	0	0	0	0	0
Control Delay (s)	9.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	A					
Approach Delay (s)	9.3	0.0		0.0		
Approach LOS	A					

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		

APPENDIX F: INTERSECTION QUEUE LENGTHS WORKSHEETS

Attachment V

Queues
1: Mission Boulevard & Tennyson Road

06/04/2019

	↗	→	↘	←	↖	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	358	3	270	13	1	213	1399	9	1801	260
v/c Ratio	0.57	0.01	0.53	0.07	0.00	0.78	0.45	0.07	0.71	0.30
Control Delay	38.7	34.7	8.7	39.6	0.0	64.7	16.0	52.2	23.6	10.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.7	34.7	8.7	39.6	0.0	64.7	16.0	52.2	23.6	10.3
Queue Length 50th (ft)	84	1	0	6	0	54	90	4	207	25
Queue Length 95th (ft)	186	11	72	27	0	#201	474	27	#745	153
Internal Link Dist (ft)		2071		561			1386		1040	
Turn Bay Length (ft)	470		225		315	500		234		210
Base Capacity (vph)	1286	698	761	676	648	272	3099	120	2539	863
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.00	0.35	0.02	0.00	0.78	0.45	0.07	0.71	0.30

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
2: Mission Boulevard & Valle Vista

06/04/2019

	→	↖	↑	↘	↓
Lane Group	EBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	50	65	1493	16	2120
v/c Ratio	0.17	0.55	0.51	0.13	0.80
Control Delay	1.3	51.7	5.5	41.9	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	1.3	51.7	5.5	41.9	15.3
Queue Length 50th (ft)	0	35	32	9	358
Queue Length 95th (ft)	0	m#79	m#486	29	#962
Internal Link Dist (ft)	808		946		1386
Turn Bay Length (ft)		223		69	
Base Capacity (vph)	581	118	2933	122	2651
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.09	0.55	0.51	0.13	0.80

Intersection Summary

#	95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m	Volume for 95th percentile queue is metered by upstream signal.

Queues
3: Mission Boulevard & Industrial Pkwy

	↗	→	↘	↙	←	↖	↖	↑	↘	↓
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	276	303	158	24	279	313	337	1126	95	1989
v/c Ratio	0.90	0.33	0.31	0.24	0.49	0.65	0.98	0.46	0.52	0.86
Control Delay	74.4	13.6	4.7	47.0	36.2	13.1	76.1	10.6	48.3	25.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.4	13.6	4.7	47.0	36.2	13.1	76.1	10.6	48.3	25.9
Queue Length 50th (ft)	81	34	0	13	78	21	102	31	52	320
Queue Length 95th (ft)	#155	67	36	39	102	88	#180	143	100	#533
Internal Link Dist (ft)		822			359			855		351
Turn Bay Length (ft)	200		190	200		120	286		210	
Base Capacity (vph)	305	1015	545	98	904	606	343	2433	203	2309
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.30	0.29	0.24	0.31	0.52	0.98	0.46	0.47	0.86

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
4: Mission Blvd/Mission Boulevard & Garin Avenue

06/04/2019

	↙	↖	↑	↗	↘	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	23	113	1216	22	92	1529
v/c Ratio	0.07	0.30	0.54	0.02	0.43	0.39
Control Delay	27.4	7.1	12.8	1.8	25.9	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.4	7.1	12.8	1.8	25.9	1.8
Queue Length 50th (ft)	12	0	320	4	49	16
Queue Length 95th (ft)	24	33	#494	m2	m54	78
Internal Link Dist (ft)	445		1128			855
Turn Bay Length (ft)	70			100	200	
Base Capacity (vph)	649	652	2263	1016	216	3916
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.17	0.54	0.02	0.43	0.39

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues

5: Mission Boulevard/Mission Blvd & Arrowhead Way

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	26	86	21	52	16	1180	38	1511
v/c Ratio	0.13	0.28	0.11	0.18	0.09	0.47	0.21	0.56
Control Delay	30.5	14.5	29.9	19.1	36.9	9.7	47.5	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.5	14.5	29.9	19.1	36.9	9.7	47.5	5.7
Queue Length 50th (ft)	14	14	11	14	9	238	21	57
Queue Length 95th (ft)	27	41	24	34	m18	429	49	#628
Internal Link Dist (ft)		512		308		1081		1128
Turn Bay Length (ft)	150				300		300	
Base Capacity (vph)	478	632	451	630	177	2485	177	2694
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.14	0.05	0.08	0.09	0.47	0.21	0.56

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
6: Mission Boulevard & Fairway St

06/04/2019

	→	←	↖	↖	↑	↘	↓
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	304	95	45	1	961	22	1557
v/c Ratio	0.77	0.25	0.08	0.01	0.49	0.12	0.75
Control Delay	41.0	24.1	0.3	37.0	16.4	47.6	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.0	24.1	0.3	37.0	16.4	47.6	11.9
Queue Length 50th (ft)	159	42	0	1	130	13	97
Queue Length 95th (ft)	219	71	0	5	313	m18	#665
Internal Link Dist (ft)	757	838			678		300
Turn Bay Length (ft)			120	200		303	
Base Capacity (vph)	528	497	685	177	1974	177	2075
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.19	0.07	0.01	0.49	0.12	0.75

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Attachment V

Queues

7: Arrowhead Way/Dixon St & Industrial Pkwy

06/04/2019

	↗	→	↙	←	↖	↑	↓	↙
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	237	718	5	1378	129	45	152	277
v/c Ratio	0.78	0.31	0.04	0.85	0.63	0.14	0.62	0.55
Control Delay	51.0	0.3	38.6	26.5	42.9	19.6	39.9	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.0	0.3	38.6	26.5	42.9	19.6	39.9	8.1
Queue Length 50th (ft)	106	0	2	295	59	12	69	2
Queue Length 95th (ft)	#254	0	14	#579	111	37	125	58
Internal Link Dist (ft)		3311		822		406	1782	
Turn Bay Length (ft)	72		89		120			100
Base Capacity (vph)	350	2328	233	1628	317	505	381	638
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.31	0.02	0.85	0.41	0.09	0.40	0.43

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
1: Mission Boulevard & Tennyson Road

06/04/2019

	↗	→	↘	←	↖	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	383	4	270	28	2	413	1843	35	1302	357
v/c Ratio	0.67	0.01	0.55	0.17	0.01	0.91	0.59	0.47	0.50	0.38
Control Delay	60.3	44.2	9.6	56.8	0.0	75.4	21.7	85.5	25.6	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.3	44.2	9.6	56.8	0.0	75.4	21.7	85.5	25.6	8.6
Queue Length 50th (ft)	171	3	0	25	0	~247	190	32	247	39
Queue Length 95th (ft)	207	13	73	47	0	#356	#734	#71	466	166
Internal Link Dist (ft)		2071		561			1386		1040	
Turn Bay Length (ft)	470		225		315	500		234		210
Base Capacity (vph)	809	439	579	431	468	456	3144	75	2613	940
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.01	0.47	0.06	0.00	0.91	0.59	0.47	0.50	0.38

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
2: Mission Boulevard & Valle Vista

06/04/2019

	→	↖	↑	↘	↓
Lane Group	EBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	62	45	2212	14	1583
v/c Ratio	0.33	0.43	0.73	0.18	0.55
Control Delay	8.5	77.9	15.2	61.8	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	8.5	77.9	15.2	61.8	6.5
Queue Length 50th (ft)	0	40	481	13	191
Queue Length 95th (ft)	22	m67	#1142	m28	224
Internal Link Dist (ft)	808		946		1386
Turn Bay Length (ft)		223		69	
Base Capacity (vph)	377	116	3025	76	2855
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.16	0.39	0.73	0.18	0.55

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
3: Mission Boulevard & Industrial Pkwy

	↗	→	↘	↙	←	↖	↖	↑	↘	↓
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	580	428	244	7	142	190	274	1474	113	1378
v/c Ratio	0.84	0.37	0.39	0.11	0.38	0.56	0.72	0.61	0.65	0.60
Control Delay	65.5	14.7	5.2	70.0	59.4	13.5	58.5	15.9	75.9	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.5	14.7	5.2	70.0	59.4	13.5	58.5	15.9	75.9	16.0
Queue Length 50th (ft)	263	67	0	6	66	0	136	186	0	317
Queue Length 95th (ft)	323	106	62	24	93	70	162	343	175	267
Internal Link Dist (ft)		822			359			855		351
Turn Bay Length (ft)	200		190	200		120	286		210	
Base Capacity (vph)	784	1313	692	63	581	418	416	2404	202	2289
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.33	0.35	0.11	0.24	0.45	0.66	0.61	0.56	0.60

Intersection Summary

Queues
4: Mission Blvd/Mission Boulevard & Garin Avenue

06/04/2019

	↙	↖	↑	↗	↘	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	36	86	1620	36	138	1409
v/c Ratio	0.18	0.33	0.66	0.03	0.74	0.34
Control Delay	54.7	12.8	6.6	1.7	73.8	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.7	12.8	6.6	1.7	73.8	3.9
Queue Length 50th (ft)	31	0	224	4	132	66
Queue Length 95th (ft)	56	45	218	m1	190	110
Internal Link Dist (ft)	445		1128			855
Turn Bay Length (ft)	70			100	200	
Base Capacity (vph)	417	438	2444	1097	219	4184
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.20	0.66	0.03	0.63	0.34

Intersection Summary
m Volume for 95th percentile queue is metered by upstream signal.

Queues
5: Mission Boulevard/Mission Blvd & Arrowhead Way

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	12	56	21	62	65	1632	47	1412
v/c Ratio	0.10	0.28	0.17	0.31	0.45	0.59	0.39	0.52
Control Delay	54.4	26.5	56.8	24.6	51.8	4.1	75.7	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.4	26.5	56.8	24.6	51.8	4.1	75.7	7.6
Queue Length 50th (ft)	11	16	19	15	58	198	44	71
Queue Length 95th (ft)	27	50	39	52	m83	87	77	525
Internal Link Dist (ft)		512		308		1081		1128
Turn Bay Length (ft)	150				300		300	
Base Capacity (vph)	283	416	296	418	164	2773	128	2728
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.13	0.07	0.15	0.40	0.59	0.37	0.52

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

	→	←	↖	↖	↑	↘	↓
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	229	65	16	8	1642	41	1416
v/c Ratio	0.85	0.23	0.04	0.07	0.70	0.36	0.56
Control Delay	80.7	47.4	0.2	63.1	18.5	61.3	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	80.7	47.4	0.2	63.1	18.5	61.3	6.6
Queue Length 50th (ft)	202	51	0	7	484	39	47
Queue Length 95th (ft)	280	88	0	26	695	m67	279
Internal Link Dist (ft)	757	838			678		300
Turn Bay Length (ft)			120	200		303	
Base Capacity (vph)	362	380	478	116	2347	120	2543
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.17	0.03	0.07	0.70	0.34	0.56

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Queues
7: Arrowhead Way/Dixon St & Industrial Pkwy

06/04/2019

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	199	1293	9	782	74	48	95	253
v/c Ratio	0.62	0.59	0.06	0.56	0.33	0.15	0.39	0.52
Control Delay	36.3	10.1	34.9	16.7	28.2	19.1	29.3	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.3	10.1	34.9	16.7	28.2	19.1	29.3	8.0
Queue Length 50th (ft)	64	93	3	99	24	11	31	0
Queue Length 95th (ft)	#200	391	20	237	67	40	81	54
Internal Link Dist (ft)		3311		822		406	1782	
Turn Bay Length (ft)	72		89		120			100
Base Capacity (vph)	467	2569	311	2145	475	663	512	741
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.50	0.03	0.36	0.16	0.07	0.19	0.34

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
Existing + Project AM
1: Mission Boulevard & Tennyson Road

Lane Group	EBL	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	362	3	282	13	1	239	1415	18	1813	260
v/c Ratio	0.66	0.01	0.58	0.09	0.00	0.61	0.42	0.23	0.65	0.28
Control Delay	62.4	46.3	10.1	56.4	0.0	67.2	16.6	73.2	26.9	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.4	46.3	10.1	56.4	0.0	67.2	16.6	73.2	26.9	11.1
Queue Length 50th (ft)	167	2	0	12	0	110	183	17	420	52
Queue Length 95th (ft)	202	11	77	29	0	#222	477	45	#745	158
Internal Link Dist (ft)		2071		561			1386		1040	
Turn Bay Length (ft)	470		225		315	500		234		210
Base Capacity (vph)	786	426	580	414	426	394	3356	80	2784	931
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.01	0.49	0.03	0.00	0.61	0.42	0.23	0.65	0.28

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

	→	↰	↑	↳	↓
Lane Group	EBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	62	103	1552	16	2120
v/c Ratio	0.34	0.65	0.51	0.21	0.79
Control Delay	9.2	81.7	5.8	73.1	14.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	9.2	81.7	5.8	73.1	14.6
Queue Length 50th (ft)	0	93	86	15	574
Queue Length 95th (ft)	24	#232	495	42	994
Internal Link Dist (ft)	808		946		1386
Turn Bay Length (ft)		223		69	
Base Capacity (vph)	373	159	3036	78	2693
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.17	0.65	0.51	0.21	0.79

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

3: Mission Boulevard & Industrial Pkwy

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	301	303	158	24	279	313	338	1138	147	2033
v/c Ratio	0.82	0.37	0.36	0.37	0.61	0.82	0.82	0.41	0.77	0.77
Control Delay	89.9	25.9	8.8	92.7	72.3	40.0	86.1	22.5	94.2	31.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	89.9	25.9	8.8	92.7	72.3	40.0	86.1	22.5	94.2	31.2
Queue Length 50th (ft)	163	73	0	26	152	117	182	254	152	579
Queue Length 95th (ft)	#230	114	67	61	190	225	240	318	#288	740
Internal Link Dist (ft)		822			359			855		351
Turn Bay Length (ft)	200		190	200		120	286		210	
Base Capacity (vph)	379	922	488	66	651	459	442	2802	197	2651
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.33	0.32	0.36	0.43	0.68	0.76	0.41	0.75	0.77

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
Existing + Project AM

4: Mission Blvd/Mission Boulevard & Garin Avenue

	↙	↖	↑	↗	↘	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	23	113	1228	22	107	1546
v/c Ratio	0.07	0.30	0.54	0.02	0.50	0.39
Control Delay	28.4	7.3	14.9	9.0	46.7	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.4	7.3	14.9	9.0	46.7	5.9
Queue Length 50th (ft)	12	0	201	2	59	82
Queue Length 95th (ft)	25	34	#478	19	112	243
Internal Link Dist (ft)	445		1128			855
Turn Bay Length (ft)	70			100	200	
Base Capacity (vph)	634	640	2286	1026	213	3942
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.18	0.54	0.02	0.50	0.39

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

5: Mission Boulevard/Mission Blvd & Arrowhead Way

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	26	86	21	52	17	1192	39	1527
v/c Ratio	0.14	0.30	0.12	0.19	0.10	0.47	0.23	0.58
Control Delay	33.1	15.6	32.6	20.7	28.8	6.6	43.6	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.1	15.6	32.6	20.7	28.8	6.6	43.6	11.9
Queue Length 50th (ft)	15	15	12	15	10	128	22	116
Queue Length 95th (ft)	29	44	25	37	m16	192	54	#643
Internal Link Dist (ft)		512		308		1081		1128
Turn Bay Length (ft)	150				300		300	
Base Capacity (vph)	453	601	418	598	167	2540	167	2640
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.14	0.05	0.09	0.10	0.47	0.23	0.58

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues

6: Mission Boulevard & Fairway St

	→	←	↖	↰	↑	↘	↓
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	304	95	45	1	973	26	1574
v/c Ratio	0.80	0.26	0.08	0.01	0.48	0.16	0.74
Control Delay	46.5	26.5	0.3	39.0	15.7	43.2	18.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.5	26.5	0.3	39.0	15.7	43.2	18.2
Queue Length 50th (ft)	171	45	0	1	137	15	185
Queue Length 95th (ft)	239	77	0	6	314	m22	#674
Internal Link Dist (ft)	757	838			678		300
Turn Bay Length (ft)			120	200		303	
Base Capacity (vph)	495	469	651	167	2034	167	2130
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.20	0.07	0.01	0.48	0.16	0.74

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

7: Arrowhead Way/Dixon St & Industrial Pkwy

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	245	765	14	1410	129	45	152	277
v/c Ratio	0.80	0.33	0.11	0.87	0.63	0.14	0.62	0.55
Control Delay	52.6	7.9	39.2	27.9	43.1	19.6	39.9	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.6	7.9	39.2	27.9	43.1	19.6	39.9	8.2
Queue Length 50th (ft)	110	59	6	306	59	12	69	2
Queue Length 95th (ft)	#266	195	27	#601	111	37	125	59
Internal Link Dist (ft)		3311		822		406	1782	
Turn Bay Length (ft)	72		89		120			100
Base Capacity (vph)	349	2338	233	1624	316	504	380	637
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.33	0.06	0.87	0.41	0.09	0.40	0.43

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
Existing Plus Project PM

1: Mission Boulevard & Tennyson Road

	↗	→	↘	←	↖	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	383	4	282	28	2	423	1853	35	1314	357
Protected Phases	3	3		4		1	6	5	2	
Permitted Phases			3		4					2
v/c Ratio	0.70	0.01	0.58	0.19	0.01	0.82	0.58	0.41	0.50	0.38
Control Delay	67.6	50.0	10.4	63.7	0.0	73.8	27.3	84.4	28.5	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.6	50.0	10.4	63.7	0.0	73.8	27.3	84.4	28.5	11.4
90th %ile Green (s)	33.0	33.0	33.0	33.0	33.0	23.0	63.0	6.0	46.0	46.0
90th %ile Term Code	Ped	Ped	Ped	Ped	Ped	Max	Coord	Max	Coord	Coord
70th %ile Green (s)	26.3	26.3	26.3	8.8	8.8	26.5	90.2	9.7	73.4	73.4
70th %ile Term Code	Gap	Gap	Gap	Gap	Gap	Gap	Coord	Gap	Coord	Coord
50th %ile Green (s)	24.1	24.1	24.1	7.8	7.8	24.3	94.6	8.5	78.8	78.8
50th %ile Term Code	Gap	Gap	Gap	Gap	Gap	Gap	Coord	Gap	Coord	Coord
30th %ile Green (s)	21.0	21.0	21.0	0.0	0.0	22.1	110.8	7.2	95.9	95.9
30th %ile Term Code	Gap	Gap	Gap	Skip	Skip	Gap	Coord	Gap	Coord	Coord
10th %ile Green (s)	17.0	17.0	17.0	0.0	0.0	18.8	126.0	0.0	103.2	103.2
10th %ile Term Code	Gap	Gap	Gap	Skip	Skip	Gap	Coord	Skip	Coord	Coord
Queue Length 50th (ft)	189	3	0	28	0	197	580	34	307	63
Queue Length 95th (ft)	230	14	80	52	0	#295	609	#81	517	205
Internal Link Dist (ft)		2071		561			1386		1040	
Turn Bay Length (ft)	470		225		315	500		234		210
Base Capacity (vph)	740	401	562	394	425	537	3221	86	2640	935
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.01	0.50	0.07	0.00	0.79	0.58	0.41	0.50	0.38

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2: Mission Boulevard & Valle Vista

	↗	→	↖	↑	↘	↓	
Lane Group	EBL	EBT	NBL	NBT	SBL	SBT	Ø4
Lane Group Flow (vph)	0	72	71	2257	14	1583	
Protected Phases		8	1	6	5	2	4
Permitted Phases	8						
v/c Ratio		0.41	0.46	0.76	0.19	0.59	
Control Delay		16.8	65.8	14.1	65.5	20.6	
Queue Delay		0.0	0.0	0.0	0.0	0.0	
Total Delay		16.8	65.8	14.1	65.5	20.6	
90th %ile Green (s)	29.0	29.0	9.0	105.0	6.0	102.0	29.0
90th %ile Term Code	Ped	Ped	Max	Coord	Max	Coord	Hold
70th %ile Green (s)	7.1	7.1	32.1	125.4	7.5	100.8	7.1
70th %ile Term Code	Gap	Gap	Hold	Coord	Gap	Coord	Hold
50th %ile Green (s)	5.5	5.5	10.5	138.5	0.0	124.0	5.5
50th %ile Term Code	Gap	Gap	Hold	Coord	Skip	Coord	Hold
30th %ile Green (s)	5.5	5.5	8.8	138.5	0.0	125.7	5.5
30th %ile Term Code	Gap	Gap	Gap	Coord	Skip	Coord	Hold
10th %ile Green (s)	5.5	5.5	6.9	138.5	0.0	127.6	5.5
10th %ile Term Code	Gap	Gap	Gap	Coord	Skip	Coord	Hold
Queue Length 50th (ft)		0	72	472	13	324	
Queue Length 95th (ft)		41	m#116	489	m30	517	
Internal Link Dist (ft)		808		946		1386	
Turn Bay Length (ft)			223		69		
Base Capacity (vph)		350	161	2987	74	2679	
Starvation Cap Reductn		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0	0	
Reduced v/c Ratio		0.21	0.44	0.76	0.19	0.59	

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

3: Mission Boulevard & Industrial Pkwy

	↗	→	↘	↙	←	↖	↖	↑	↘	↓
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	632	428	244	7	142	190	277	1486	173	1405
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases			4			8				
v/c Ratio	0.87	0.36	0.38	0.12	0.40	0.58	0.63	0.64	0.83	0.63
Control Delay	71.5	16.0	5.4	77.2	66.5	14.7	70.0	34.9	93.2	39.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.5	16.0	5.4	77.2	66.5	14.7	70.0	34.9	93.2	39.5
90th %ile Green (s)	36.0	55.0	55.0	4.0	23.0	23.0	19.0	59.0	18.0	58.0
90th %ile Term Code	Max	Hold	Hold	Max	Ped	Ped	Max	Coord	Max	Coord
70th %ile Green (s)	35.9	62.9	62.9	0.0	23.0	23.0	19.0	59.0	18.1	58.1
70th %ile Term Code	Gap	Hold	Hold	Skip	Ped	Ped	Max	Coord	Max	Coord
50th %ile Green (s)	33.2	48.7	48.7	0.0	11.5	11.5	22.1	69.9	21.4	69.2
50th %ile Term Code	Gap	Hold	Hold	Skip	Gap	Gap	Hold	Coord	Gap	Coord
30th %ile Green (s)	30.5	44.7	44.7	0.0	10.2	10.2	20.2	76.7	18.6	75.1
30th %ile Term Code	Gap	Hold	Hold	Skip	Gap	Gap	Hold	Coord	Gap	Coord
10th %ile Green (s)	26.5	38.8	38.8	0.0	8.3	8.3	18.6	86.7	14.5	82.6
10th %ile Term Code	Gap	Hold	Hold	Skip	Gap	Gap	Hold	Coord	Gap	Coord
Queue Length 50th (ft)	315	73	0	7	73	0	134	412	182	320
Queue Length 95th (ft)	381	115	65	25	102	74	189	529	#311	539
Internal Link Dist (ft)		822			359			855		351
Turn Bay Length (ft)	200		190	200		120	286		210	
Base Capacity (vph)	807	1300	686	57	532	399	445	2333	217	2229
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.33	0.36	0.12	0.27	0.48	0.62	0.64	0.80	0.63

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

4: Mission Blvd/Mission Boulevard & Garin Avenue

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	36	86	1632	36	150	1418
Protected Phases	4		2		1	6
Permitted Phases		4		2		
v/c Ratio	0.12	0.25	0.79	0.04	0.62	0.36
Control Delay	28.4	8.0	20.7	8.3	47.1	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.4	8.0	20.7	8.3	47.1	5.0
90th %ile Green (s)	26.3	26.3	35.7	35.7	11.3	50.7
90th %ile Term Code	Ped	Ped	Coord	Coord	Max	Coord
70th %ile Green (s)	12.0	12.0	47.6	47.6	13.7	65.0
70th %ile Term Code	Min	Min	Coord	Coord	Gap	Coord
50th %ile Green (s)	12.0	12.0	49.5	49.5	11.8	65.0
50th %ile Term Code	Min	Min	Coord	Coord	Gap	Coord
30th %ile Green (s)	12.0	12.0	50.3	50.3	11.0	65.0
30th %ile Term Code	Min	Min	Coord	Coord	Min	Coord
10th %ile Green (s)	0.0	0.0	66.0	66.0	11.0	80.7
10th %ile Term Code	Skip	Skip	Coord	Coord	Min	Coord
Queue Length 50th (ft)	17	0	333	4	77	72
Queue Length 95th (ft)	35	32	#667	24	#154	177
Internal Link Dist (ft)	445		1128			855
Turn Bay Length (ft)	70			100	200	
Base Capacity (vph)	543	545	2059	927	245	3936
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.16	0.79	0.04	0.61	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

5: Mission Boulevard/Mission Blvd & Arrowhead Way

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	12	56	21	62	67	1644	65	1422
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8					
v/c Ratio	0.06	0.21	0.11	0.22	0.36	0.68	0.38	0.59
Control Delay	30.7	16.1	32.4	15.0	35.1	11.8	47.0	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	16.1	32.4	15.0	35.1	11.8	47.0	14.1
90th %ile Green (s)	32.0	32.0	32.0	32.0	9.0	41.0	9.0	41.0
90th %ile Term Code	Ped	Ped	Hold	Hold	Max	Coord	Max	Coord
70th %ile Green (s)	9.0	9.0	9.0	9.0	9.0	62.8	10.2	64.0
70th %ile Term Code	Min	Min	Min	Min	Max	Coord	Gap	Coord
50th %ile Green (s)	9.0	9.0	9.0	9.0	9.0	64.0	9.0	64.0
50th %ile Term Code	Min	Min	Min	Min	Max	Coord	Min	Coord
30th %ile Green (s)	9.0	9.0	9.0	9.0	14.0	64.0	9.0	59.0
30th %ile Term Code	Min	Min	Min	Min	Hold	Coord	Min	Coord
10th %ile Green (s)	0.0	0.0	0.0	0.0	0.0	89.8	0.0	89.8
10th %ile Term Code	Skip	Skip	Skip	Skip	Skip	Coord	Skip	Coord
Queue Length 50th (ft)	7	10	12	10	35	82	38	217
Queue Length 95th (ft)	17	34	25	35	m43	#695	79	#574
Internal Link Dist (ft)		512		308		1081		1128
Turn Bay Length (ft)	150				300		300	
Base Capacity (vph)	450	588	451	589	186	2428	172	2400
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.10	0.05	0.11	0.36	0.68	0.38	0.59

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

6: Mission Boulevard & Fairway St

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	0	229	0	65	16	8	1654	41	1426
Protected Phases		4		8		5	2	1	6
Permitted Phases	4		8		8				
v/c Ratio		0.73		0.20	0.04	0.05	0.78	0.25	0.62
Control Delay		46.1		28.4	0.1	40.0	21.3	42.7	15.0
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		46.1		28.4	0.1	40.0	21.3	42.7	15.0
90th %ile Green (s)	34.0	34.0	34.0	34.0	34.0	9.0	39.0	9.0	39.0
90th %ile Term Code	Hold	Hold	Ped	Ped	Ped	Max	Coord	Max	Coord
70th %ile Green (s)	23.0	23.0	23.0	23.0	23.0	0.0	50.0	9.0	63.2
70th %ile Term Code	Gap	Gap	Hold	Hold	Hold	Skip	Coord	Max	Coord
50th %ile Green (s)	19.7	19.7	19.7	19.7	19.7	0.0	53.3	9.0	66.5
50th %ile Term Code	Gap	Gap	Hold	Hold	Hold	Skip	Coord	Max	Coord
30th %ile Green (s)	16.3	16.3	16.3	16.3	16.3	0.0	69.9	0.0	69.9
30th %ile Term Code	Gap	Gap	Hold	Hold	Hold	Skip	Coord	Skip	Coord
10th %ile Green (s)	11.5	11.5	11.5	11.5	11.5	0.0	74.7	0.0	74.7
10th %ile Term Code	Gap	Gap	Hold	Hold	Hold	Skip	Coord	Skip	Coord
Queue Length 50th (ft)		130		33	0	5	406	23	146
Queue Length 95th (ft)		172		55	0	19	#761	m33	#574
Internal Link Dist (ft)		757		838			678		300
Turn Bay Length (ft)					120	200		303	
Base Capacity (vph)		510		533	651	167	2121	167	2311
Starvation Cap Reductn		0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0	0
Reduced v/c Ratio		0.45		0.12	0.02	0.05	0.78	0.25	0.62

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

7: Arrowhead Way/Dixon St & Industrial Pkwy

	↗	→	↙	←	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	213	1307	15	801	74	48	0	95	253
Protected Phases	5	2	1	6		8		4	
Permitted Phases					8		4		4
v/c Ratio	0.64	0.59	0.09	0.57	0.34	0.15		0.40	0.53
Control Delay	37.3	10.2	35.4	17.0	28.9	19.5		30.1	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	37.3	10.2	35.4	17.0	28.9	19.5		30.1	8.1
90th %ile Green (s)	15.0	43.1	6.9	35.0	27.0	27.0	27.0	27.0	27.0
90th %ile Term Code	Max	Hold	Gap	Max	Ped	Ped	Ped	Ped	Ped
70th %ile Green (s)	15.0	48.9	0.0	29.9	10.8	10.8	10.8	10.8	10.8
70th %ile Term Code	Max	Hold	Skip	Gap	Hold	Hold	Gap	Gap	Gap
50th %ile Green (s)	12.1	41.2	0.0	25.1	8.7	8.7	8.7	8.7	8.7
50th %ile Term Code	Gap	Hold	Skip	Gap	Hold	Hold	Gap	Gap	Gap
30th %ile Green (s)	9.6	33.9	0.0	20.3	6.8	6.8	6.8	6.8	6.8
30th %ile Term Code	Gap	Hold	Skip	Gap	Hold	Hold	Gap	Gap	Gap
10th %ile Green (s)	7.1	27.1	0.0	16.0	5.0	5.0	5.0	5.0	5.0
10th %ile Term Code	Gap	Hold	Skip	Gap	Hold	Hold	Min	Min	Min
Queue Length 50th (ft)	70	95	5	105	25	11		32	0
Queue Length 95th (ft)	#220	404	28	244	67	40		81	54
Internal Link Dist (ft)		3311		822		406		1782	
Turn Bay Length (ft)	72		89		120				100
Base Capacity (vph)	453	2529	302	2087	462	645		498	728
Starvation Cap Reductn	0	0	0	0	0	0		0	0
Spillback Cap Reductn	0	0	0	0	0	0		0	0
Storage Cap Reductn	0	0	0	0	0	0		0	0
Reduced v/c Ratio	0.47	0.52	0.05	0.38	0.16	0.07		0.19	0.35

Intersection Summary

90th %ile Actuated Cycle: 91
70th %ile Actuated Cycle: 69.7
50th %ile Actuated Cycle: 59.9
30th %ile Actuated Cycle: 50.7
10th %ile Actuated Cycle: 42.1
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
1: Mission Boulevard & Tennyson Road

06/04/2019

	↗	→	↘	←	↖	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	678	18	477	158	11	315	1399	38	2432	603
v/c Ratio	0.88	0.04	0.77	0.64	0.04	0.58	0.58	0.41	1.34	0.84
Control Delay	67.7	43.7	23.5	69.3	0.3	61.0	30.4	79.3	195.1	36.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.7	43.7	23.5	69.3	0.3	61.0	30.4	79.3	195.1	36.0
Queue Length 50th (ft)	317	13	121	144	0	142	350	35	~1079	328
Queue Length 95th (ft)	#410	36	267	197	0	#308	470	#84	#1178	#526
Internal Link Dist (ft)		2071		561			1386		1040	
Turn Bay Length (ft)	470		225		315	500		234		210
Base Capacity (vph)	786	426	626	417	426	542	2419	92	1811	722
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.04	0.76	0.38	0.03	0.58	0.58	0.41	1.34	0.84

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
2: Mission Boulevard & Valle Vista Ave

	→	↖	↑	↘	↓
Lane Group	EBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	195	68	1493	16	2984
v/c Ratio	0.76	0.72	0.53	0.21	1.15
Control Delay	53.3	104.4	8.1	73.1	91.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	53.3	104.4	8.1	73.1	91.2
Queue Length 50th (ft)	105	64	183	15	~1730
Queue Length 95th (ft)	178	#143	463	42	#2002
Internal Link Dist (ft)	808		946		1386
Turn Bay Length (ft)		223		69	
Base Capacity (vph)	373	97	2795	78	2606
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.52	0.70	0.53	0.21	1.15

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

3: Mission Boulevard & Industrial Pkwy

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	341	564	384	39	422	313	589	1126	95	2995
v/c Ratio	0.90	0.61	0.72	0.61	0.75	0.74	1.33	0.41	0.66	1.22
Control Delay	98.6	33.6	29.0	112.4	73.9	32.3	215.7	23.0	93.2	137.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	98.6	33.6	29.0	112.4	73.9	32.3	215.7	23.0	93.2	137.8
Queue Length 50th (ft)	188	174	163	42	228	110	~419	254	100	~1419
Queue Length 95th (ft)	#280	237	304	#100	284	225	#544	315	164	#1527
Internal Link Dist (ft)		822			359			855		351
Turn Bay Length (ft)	200		190	200		120	286		210	
Base Capacity (vph)	379	961	548	65	651	459	442	2765	173	2456
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.59	0.70	0.60	0.65	0.68	1.33	0.41	0.55	1.22

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
4: Mission Blvd/Mission Boulevard & Garin Avenue

06/04/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	30	314	1230	22	293	2514
v/c Ratio	0.10	0.63	0.81	0.03	0.64	0.68
Control Delay	29.0	12.1	28.4	10.8	41.1	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.0	12.1	28.4	10.8	41.1	9.6
Queue Length 50th (ft)	16	24	298	3	149	184
Queue Length 95th (ft)	30	76	#480	19	#387	533
Internal Link Dist (ft)	445		1128			855
Turn Bay Length (ft)	70			100	200	
Base Capacity (vph)	634	739	1521	687	460	3714
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.42	0.81	0.03	0.64	0.68

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
5: Mission Boulevard/Mission Blvd & Arrowhead Way

06/04/2019

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	26	107	35	52	21	1219	65	2482
v/c Ratio	0.13	0.35	0.22	0.19	0.13	0.50	0.38	0.94
Control Delay	33.0	16.0	35.7	20.6	28.4	9.4	47.0	24.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.0	16.0	35.7	20.6	28.4	9.4	47.0	24.5
Queue Length 50th (ft)	15	20	20	15	10	181	38	359
Queue Length 95th (ft)	29	51	37	37	m16	m199	79	#1280
Internal Link Dist (ft)		512		308		1081		1128
Turn Bay Length (ft)	150				300		300	
Base Capacity (vph)	453	611	371	598	167	2425	172	2637
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.18	0.09	0.09	0.13	0.50	0.38	0.94

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
6: Mission Boulevard & Fairway St

06/04/2019

	→	←	↖	↰	↑	↘	↓
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	330	285	83	1	1018	25	2536
v/c Ratio	0.99	0.74	0.13	0.01	0.58	0.15	1.37
Control Delay	77.4	40.0	1.5	39.0	19.8	43.9	190.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.4	40.0	1.5	39.0	19.8	43.9	190.2
Queue Length 50th (ft)	191	147	0	1	191	13	~1053
Queue Length 95th (ft)	#372	#271	10	6	334	m13	m#1281
Internal Link Dist (ft)	757	838			678		300
Turn Bay Length (ft)			120	200		303	
Base Capacity (vph)	339	391	651	167	1752	167	1854
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.97	0.73	0.13	0.01	0.58	0.15	1.37

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

7: Arrowhead Way/Dixon St & Industrial Pkwy

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	283	884	5	2081	129	62	576	747
v/c Ratio	0.93	0.41	0.05	1.44	1.48	0.14	1.77	1.26
Control Delay	73.2	10.2	39.8	225.5	294.7	18.5	381.3	151.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.2	10.2	39.8	225.5	294.7	18.5	381.3	151.5
Queue Length 50th (ft)	148	102	3	~795	~97	17	~468	~398
Queue Length 95th (ft)	#321	228	14	#1042	#206	46	#664	#617
Internal Link Dist (ft)		3311		822		406	1782	
Turn Bay Length (ft)	72		89		120			100
Base Capacity (vph)	312	2151	208	1448	87	458	326	593
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.41	0.02	1.44	1.48	0.14	1.77	1.26

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Attachment V

Queues
1: Mission Boulevard & Tennyson Road

06/04/2019

	↗	→	↘	←	↖	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	743	25	396	99	4	668	1844	122	1302	751
v/c Ratio	1.00	0.06	0.61	0.50	0.02	0.75	0.85	0.51	0.85	0.91
Control Delay	93.0	48.4	8.7	70.9	0.0	62.4	48.7	68.6	56.8	33.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.0	48.4	8.7	70.9	0.0	62.4	48.7	68.6	56.8	33.2
Queue Length 50th (ft)	~388	20	0	97	0	320	607	114	449	299
Queue Length 95th (ft)	#527	48	97	139	0	#577	620	#319	512	#585
Internal Link Dist (ft)		2071		561			1386		1040	
Turn Bay Length (ft)	470		225		315	500		234		210
Base Capacity (vph)	740	401	652	398	425	887	2157	238	1529	824
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.00	0.06	0.61	0.25	0.01	0.75	0.85	0.51	0.85	0.91

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
2: Mission Boulevard & Valle Vista

	→	↰	↑	↳	↓
Lane Group	EBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	187	188	2232	14	1677
v/c Ratio	0.78	0.65	0.79	0.19	0.75
Control Delay	58.0	63.0	15.8	62.7	48.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	58.0	63.0	15.8	62.7	48.3
Queue Length 50th (ft)	109	188	307	14	664
Queue Length 95th (ft)	183	m#427	474	m18	562
Internal Link Dist (ft)	808		946		1386
Turn Bay Length (ft)		223		69	
Base Capacity (vph)	348	288	2825	74	2335
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.54	0.65	0.79	0.19	0.72

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
3: Mission Boulevard & Industrial Pkwy

06/04/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	580	718	424	10	249	190	767	1827	113	1399
v/c Ratio	0.84	0.61	0.63	0.22	0.61	0.54	1.24	0.75	0.68	0.71
Control Delay	70.5	28.3	15.0	84.0	70.3	13.3	170.3	36.8	81.0	59.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.5	28.3	15.0	84.0	70.3	13.3	170.3	36.8	81.0	59.6
Queue Length 50th (ft)	290	206	95	10	128	0	~488	529	119	440
Queue Length 95th (ft)	346	266	218	32	169	74	#721	709	m169	535
Internal Link Dist (ft)		822			359			855		351
Turn Bay Length (ft)	200		190	200		120	286		210	
Base Capacity (vph)	807	1282	717	46	532	399	618	2427	208	1960
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.56	0.59	0.22	0.47	0.48	1.24	0.75	0.54	0.71

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Queues

4: Mission Blvd/Mission Boulevard & Garin Avenue

06/04/2019

	↙	↖	↑	↗	↘	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	51	523	2057	36	396	1472
v/c Ratio	0.12	0.90	1.39	0.05	1.13	0.44
Control Delay	23.4	34.5	206.8	11.5	126.6	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.4	34.5	206.8	11.5	126.6	8.3
Queue Length 50th (ft)	21	140	~787	7	~265	129
Queue Length 95th (ft)	45	#296	#924	25	#488	187
Internal Link Dist (ft)	445		1128			855
Turn Bay Length (ft)	70			100	200	
Base Capacity (vph)	543	668	1475	667	349	3344
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.78	1.39	0.05	1.13	0.44

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

5: Mission Boulevard/Mission Blvd & Arrowhead Way

06/04/2019

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
	↗	→	↙	←	↖	↑	↘	↓
Lane Group Flow (vph)	14	56	42	142	65	1985	47	1487
v/c Ratio	0.10	0.20	0.22	0.43	0.39	0.83	0.28	0.65
Control Delay	31.9	16.0	35.1	13.8	34.9	19.1	44.8	14.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.9	16.0	35.1	13.8	34.9	19.1	44.8	14.9
Queue Length 50th (ft)	8	10	24	18	31	336	27	234
Queue Length 95th (ft)	20	34	41	54	m23	m227	61	#618
Internal Link Dist (ft)		512		308		1081		1128
Turn Bay Length (ft)	150				300		300	
Base Capacity (vph)	316	588	451	627	167	2397	167	2299
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.10	0.09	0.23	0.39	0.83	0.28	0.65

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
6: Mission Boulevard & Fairway St

06/04/2019

	→	←	↖	↰	↑	↘	↓
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	639	124	16	22	2147	54	1508
v/c Ratio	1.19	0.31	0.02	0.13	1.40	0.32	0.87
Control Delay	133.6	24.8	0.1	41.5	211.0	43.7	26.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	133.6	24.8	0.1	41.5	211.0	43.7	26.3
Queue Length 50th (ft)	~470	53	0	12	~955	31	172
Queue Length 95th (ft)	#685	101	0	36	#1096	m42	#631
Internal Link Dist (ft)	757	838			678		300
Turn Bay Length (ft)			120	200		303	
Base Capacity (vph)	536	399	651	167	1530	167	1733
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.19	0.31	0.02	0.13	1.40	0.32	0.87

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
7: Arrowhead Way/Dixon St & Industrial Pkwy

06/04/2019

	↗	→	↙	←	↖	↑	↓	↙
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	730	1607	9	1390	74	79	171	489
v/c Ratio	2.22	0.70	0.08	0.91	0.34	0.21	0.63	0.87
Control Delay	579.1	14.2	40.1	31.9	30.9	23.4	39.4	28.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	579.1	14.2	40.1	31.9	30.9	23.4	39.4	28.7
Queue Length 50th (ft)	~620	240	4	327	32	28	79	94
Queue Length 95th (ft)	#923	#618	20	#565	69	62	140	216
Internal Link Dist (ft)		3311		822		406	1782	
Turn Bay Length (ft)	72		89		120			100
Base Capacity (vph)	329	2281	219	1525	278	486	350	636
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	2.22	0.70	0.04	0.91	0.27	0.16	0.49	0.77

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

1: Mission Boulevard & Tennyson Road

Lane Group	EBL	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	678	18	489	158	11	332	1415	38	2443	603
v/c Ratio	0.88	0.04	0.79	0.64	0.04	0.60	0.58	0.41	1.36	0.84
Control Delay	67.7	43.7	25.4	69.3	0.3	61.2	30.5	79.3	201.3	36.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.7	43.7	25.4	69.3	0.3	61.2	30.5	79.3	201.3	36.6
Queue Length 50th (ft)	317	13	135	144	0	150	356	35	~1098	333
Queue Length 95th (ft)	#410	36	286	197	0	#327	477	#84	#1186	#528
Internal Link Dist (ft)		2071		561			1386		1040	
Turn Bay Length (ft)	470		225		315	500		234		210
Base Capacity (vph)	786	426	626	417	426	549	2419	92	1800	718
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.04	0.78	0.38	0.03	0.60	0.58	0.41	1.36	0.84

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2: Mission Boulevard & Valle Vista

	→	↖	↑	↘	↓
Lane Group	EBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	207	95	1552	16	2984
v/c Ratio	0.78	0.98	0.56	0.21	1.16
Control Delay	55.8	152.5	8.7	73.1	96.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	55.8	152.5	8.7	73.1	96.5
Queue Length 50th (ft)	117	91	207	15	~1744
Queue Length 95th (ft)	194	#214	495	42	#2002
Internal Link Dist (ft)	808		946		1386
Turn Bay Length (ft)		223		69	
Base Capacity (vph)	374	97	2774	78	2581
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.55	0.98	0.56	0.21	1.16

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	612	477	353	39	422	313	589	1138	127	3040
v/c Ratio	1.32	0.51	0.65	0.61	0.86	0.78	1.27	0.43	0.72	1.26
Control Delay	210.7	27.4	23.2	112.4	86.7	36.6	192.0	25.0	92.6	155.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	210.7	27.4	23.2	112.4	86.7	36.6	192.0	25.0	92.6	155.8
Queue Length 50th (ft)	~432	118	116	42	234	109	~406	271	133	~1472
Queue Length 95th (ft)	#559	181	251	#100	#317	#234	#531	323	206	#1537
Internal Link Dist (ft)		822			359			855		351
Turn Bay Length (ft)	200		190	200		120	286		210	
Base Capacity (vph)	463	931	540	65	499	403	463	2653	217	2411
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.32	0.51	0.65	0.60	0.85	0.78	1.27	0.43	0.59	1.26

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

4: Mission Blvd/Mission Boulevard & Garin Avenue

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	30	314	1242	22	293	2530
v/c Ratio	0.10	0.63	0.82	0.03	0.64	0.68
Control Delay	29.0	12.2	28.8	10.8	41.1	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.0	12.2	28.8	10.8	41.1	9.7
Queue Length 50th (ft)	16	25	303	3	149	187
Queue Length 95th (ft)	30	76	#487	19	#387	539
Internal Link Dist (ft)	445		1128			855
Turn Bay Length (ft)	70			100	200	
Base Capacity (vph)	634	739	1521	687	460	3714
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.42	0.82	0.03	0.64	0.68

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

5: Mission Boulevard/Mission Blvd & Arrowhead Way

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	26	107	35	52	21	1231	65	2499
v/c Ratio	0.13	0.35	0.22	0.19	0.13	0.51	0.38	0.95
Control Delay	33.0	16.0	35.7	20.6	28.8	9.6	47.0	25.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.0	16.0	35.7	20.6	28.8	9.6	47.0	25.2
Queue Length 50th (ft)	15	20	20	15	10	182	38	368
Queue Length 95th (ft)	29	51	37	37	m16	m203	79	#1292
Internal Link Dist (ft)		512		308		1081		1128
Turn Bay Length (ft)	150				300		300	
Base Capacity (vph)	453	611	371	598	167	2425	172	2637
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.18	0.09	0.09	0.13	0.51	0.38	0.95

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

6: Mission Boulevard & Fairway St

	→	←	↖	↖	↑	↘	↓
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	330	285	83	1	1030	25	2552
v/c Ratio	0.99	0.74	0.13	0.01	0.59	0.15	1.38
Control Delay	77.4	40.0	1.5	39.0	19.9	43.9	194.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.4	40.0	1.5	39.0	19.9	43.9	194.0
Queue Length 50th (ft)	191	147	0	1	194	13	~1060
Queue Length 95th (ft)	#372	#271	10	6	340	m13	m#1281
Internal Link Dist (ft)	757	838			678		300
Turn Bay Length (ft)			120	200		303	
Base Capacity (vph)	339	391	651	167	1752	167	1854
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.97	0.73	0.13	0.01	0.59	0.15	1.38

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

7: Arrowhead Way/Dixon St & Industrial Pkwy

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	290	898	5	2114	129	62	576	747
v/c Ratio	0.94	0.42	0.05	1.46	1.48	0.14	1.77	1.26
Control Delay	75.9	10.3	40.0	236.7	296.1	18.5	382.8	152.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.9	10.3	40.0	236.7	296.1	18.5	382.8	152.2
Queue Length 50th (ft)	152	104	3	~815	~97	17	~468	~398
Queue Length 95th (ft)	#330	232	14	#1064	#206	46	#664	#617
Internal Link Dist (ft)		3311		822		406	1782	
Turn Bay Length (ft)	72		89		120			100
Base Capacity (vph)	312	2153	207	1445	87	458	326	592
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.42	0.02	1.46	1.48	0.14	1.77	1.26

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Attachment V

Queues
Cumulative Plus Project PM

1: Mission Boulevard & Tennyson Road

	↗	→	↘	←	↖	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	743	25	408	99	4	678	1854	122	1314	751
v/c Ratio	1.00	0.06	0.62	0.50	0.02	0.76	0.86	0.51	0.86	0.85
Control Delay	93.0	48.4	8.8	70.9	0.0	63.3	50.4	68.6	57.3	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.0	48.4	8.8	70.9	0.0	63.3	50.4	68.6	57.3	21.7
Queue Length 50th (ft)	~388	20	0	97	0	329	660	114	454	186
Queue Length 95th (ft)	#527	48	97	139	0	#589	626	#319	517	408
Internal Link Dist (ft)		2071		561			1386		1040	
Turn Bay Length (ft)	470		225		315	500		234		210
Base Capacity (vph)	740	401	661	398	425	887	2157	238	1528	880
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.00	0.06	0.62	0.25	0.01	0.76	0.86	0.51	0.86	0.85

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2: Mission Boulevard & Valle Vista

	→	↖	↑	↘	↓
Lane Group	EBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	197	214	2276	14	1677
v/c Ratio	0.79	0.79	0.81	0.19	0.75
Control Delay	60.2	68.2	15.4	64.2	47.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	60.2	68.2	15.4	64.2	47.1
Queue Length 50th (ft)	119	219	416	14	653
Queue Length 95th (ft)	197	m#400	m448	m18	562
Internal Link Dist (ft)	808		946		1386
Turn Bay Length (ft)		223		69	
Base Capacity (vph)	349	271	2807	74	2335
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.56	0.79	0.81	0.19	0.72

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

3: Mission Boulevard & Industrial Pkwy

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	884	598	375	10	249	190	767	1839	133	1425
v/c Ratio	1.10	0.46	0.53	0.22	0.61	0.54	1.38	0.83	0.74	0.76
Control Delay	114.2	18.3	9.9	84.0	70.3	13.3	228.6	42.9	88.1	60.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	114.2	18.3	9.9	84.0	70.3	13.3	228.6	42.9	88.1	60.0
Queue Length 50th (ft)	~512	114	46	10	128	0	~530	584	141	433
Queue Length 95th (ft)	#645	175	152	32	169	74	#721	#719	m198	545
Internal Link Dist (ft)		822			359			855		351
Turn Bay Length (ft)	200		190	200		120	286		210	
Base Capacity (vph)	807	1307	718	46	532	399	554	2218	208	1907
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.10	0.46	0.52	0.22	0.47	0.48	1.38	0.83	0.64	0.75

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

	↙	↖	↑	↗	↘	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	51	523	2068	36	396	1482
v/c Ratio	0.12	0.90	1.40	0.05	1.13	0.44
Control Delay	23.4	34.5	210.0	11.5	126.6	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.4	34.5	210.0	11.5	126.6	8.4
Queue Length 50th (ft)	21	140	~793	7	~265	130
Queue Length 95th (ft)	45	#296	#931	25	#488	188
Internal Link Dist (ft)	445		1128			855
Turn Bay Length (ft)	70			100	200	
Base Capacity (vph)	543	668	1475	667	349	3344
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.78	1.40	0.05	1.13	0.44

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

5: Mission Boulevard/Mission Blvd & Arrowhead Way

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	14	56	42	142	65	1997	47	1497
v/c Ratio	0.10	0.20	0.22	0.43	0.39	0.83	0.28	0.65
Control Delay	31.9	16.0	35.1	13.8	34.8	19.3	44.8	15.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.9	16.0	35.1	13.8	34.8	19.3	44.8	15.0
Queue Length 50th (ft)	8	10	24	18	31	342	27	237
Queue Length 95th (ft)	20	34	41	54	m22	m227	61	#626
Internal Link Dist (ft)		512		308		1081		1128
Turn Bay Length (ft)	150				300		300	
Base Capacity (vph)	316	588	451	627	167	2397	167	2299
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.10	0.09	0.23	0.39	0.83	0.28	0.65

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

6: Mission Boulevard & Fairway St

	→	←	↖	↖	↑	↘	↓
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	639	124	16	22	2159	54	1518
v/c Ratio	1.19	0.31	0.02	0.13	1.41	0.32	0.88
Control Delay	133.6	24.8	0.1	41.5	214.4	43.6	26.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	133.6	24.8	0.1	41.5	214.4	43.6	26.6
Queue Length 50th (ft)	~470	53	0	12	~964	31	173
Queue Length 95th (ft)	#685	101	0	36	#1105	m42	#638
Internal Link Dist (ft)	757	838			678		300
Turn Bay Length (ft)			120	200		303	
Base Capacity (vph)	536	399	651	167	1530	167	1733
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.19	0.31	0.02	0.13	1.41	0.32	0.88

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

7: Arrowhead Way/Dixon St & Industrial Pkwy

	↗	→	↙	←	↖	↑	↓	↙
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	738	1621	9	1408	74	79	171	489
v/c Ratio	2.24	0.71	0.08	0.92	0.34	0.21	0.63	0.87
Control Delay	590.4	14.4	40.1	33.3	30.9	23.4	39.2	29.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	590.4	14.4	40.1	33.3	30.9	23.4	39.2	29.0
Queue Length 50th (ft)	~631	247	5	336	32	28	79	95
Queue Length 95th (ft)	#932	#628	20	#577	69	62	140	218
Internal Link Dist (ft)		3311		822		406	1782	
Turn Bay Length (ft)	72		89		120			100
Base Capacity (vph)	329	2279	219	1524	278	486	350	635
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	2.24	0.71	0.04	0.92	0.27	0.16	0.49	0.77

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.