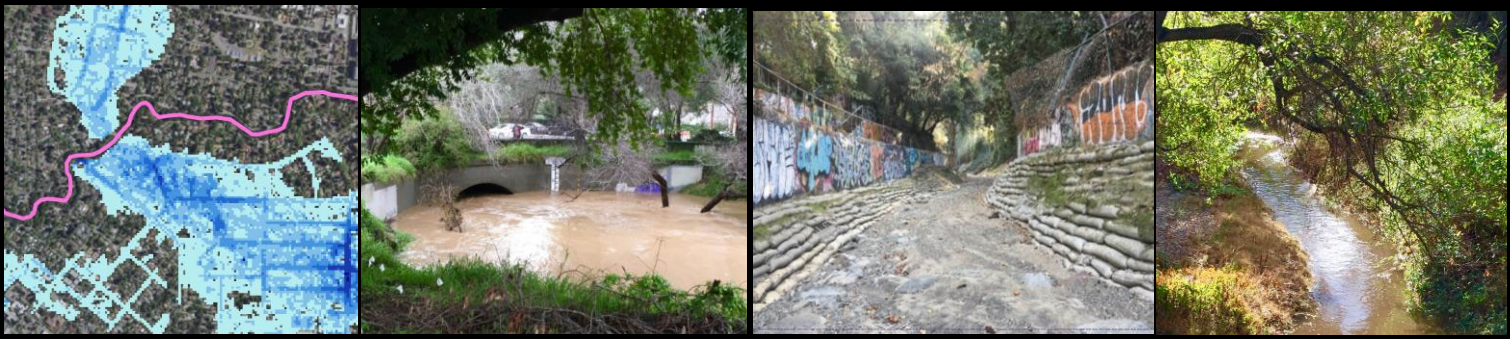
San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Final Environmental Impact Report – September 2019
Volume 2: Appendices



SCH: 2013062019

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Appendix A

Air Quality/Greenhouse Gas Emissions: Analysis of Models and Tools to Correlate Project-Generated Criteria Pollutant Emissions to Health End Points

Analysis of Models and Tools to Correlate Project-Generated Criteria Pollutant Emissions to Health End Points

Several models and tools capable of translating mass emissions of criteria pollutants to various health endpoints have been developed. Table E-1 summarizes key tools, identifies the analyzed pollutants, describes their intended application and resolution, and analyzes whether they could be used to reasonably correlate project-level emissions to specific health consequences. As shown in Table E-1, almost all tools were designed to be used at the national, state, regional, and/or city-levels. These tools are not well suited to analyze small or localized changes in pollutant concentrations associated with individual projects. Accordingly, they are generally not recommended for CEQA analyses. This attachment may be included in CEQA documents with significant air quality impacts with appropriate modification (i.e., read word-for-word the table and tailor as needed), as shown in the example text in Attachment D.

Table E-1. Analysis of Models and Tools to Correlate Project-Generated Criteria Pollutant Emissions to Health End Points

Tool	Created by	Description	Resolution	Pollutants Analyzed	Project-Level CEQA Applicability
AirCounts[1]	Abt Assoc.	Online tool that helps large and medium-sized cities quickly estimate the health benefits of PM2.5 emission reductions and economic value of those benefits. The tool estimates the number of deaths (mortality) avoided and economic value related to user-specified regional, annual PM2.5 emissions reduction. The modeling year is 2010; avoided deaths are expected to occur over a 20-year period and their present value is shown in 2010 US dollars at a 3% discount rate.	City-level	Primary PM2.5	This tool is only illustrative, as it is limited to certain cities and does not target specific sectors. Given that it was designed as a screening-level tool, is not sector specific, and includes limited California data, the tool is **not recommended** for project-level CEQA analysis.
AP2 (formerly Air Pollution Emission Experiments	Mueller and Mendelsohn, 2006	AP2 is an integrated assessment model developed to assess marginal damage impacts from emissions at the national scale but can be applied at the county-level. The model connects emissions to monetary damages through six modules: emissions (per EPA's	National or county-level	SO_2, ROG, NOx, ozone, PM2.5, PM10	The model operates at the national scale but may be applied at the county-level (although it is not clear how this adjustment should be made). The tool is also not commercially

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[1] https://www.abtassociates.com/tools

Tool	Created by	Description	Resolution	Pollutants Analyzed	Project-Level CEQA Applicability
and Policy [APEEP])[2]		national inventory), air quality modeling, concentrations, exposures, physical effects, and valuation. Damages are presented on a dollar-per-ton basis. Model extends damage assessment beyond human health, and includes assessment on reduced crop and timber yields, reductions in visibility, enhanced depreciation of man-made materials and damages due to lost recreation services.			available. Accordingly, the tool is **not recommended** for project-level CEQA analysis.
Methodology for Estimating Premature Deaths Associated with Long-Term Exposure to Fine Airborne Particulate Matter in California[3]	CARB	The staff report identifies a relative risk of premature death associated with PM2.5 exposure based on a review of all relevant scientific literature, and a new relative risk factor was developed. This new factor is a 10% increase in risk of premature death per 10 μg/m^3 increase in exposure to PM2.5 concentrations (uncertainty interval: 3% to 20%)	National		The primary author of the CARB staff report notes that the analysis method is not suited for small projects and may yield unreliable results due to various uncertainties (SCAQMD 2015). Accordingly, the tool is **not recommended** for project-level CEQA analysis.
Co-Benefits Risk Assessment (COBRA)[4]	US EPA	Preliminary screening tool that contains baseline emission estimates of a variety of air pollutants for a single year (2017). COOBRA is targeted to state and local governments as a screening assessment for clean energy policies. Users specify changes to the baseline emission estimates. COBRA then uses	National, regional, state, or county-levels	PM2.5, SO_2, NOx, NH_3, and ROG	COBRA is a preliminary screening tool only and cannot be used at sub-county resolution. It also does not account for secondary emission changes resulting from market responses. Accordingly, the tool

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[2] Original APEEP: https://www.researchgate.net/publication/253359043_The_Air_Pollution_Emission_Experiments_and_Policy_Analysis_Model_APEEP_Technical_Appendix

[3] https://www.arb.ca.gov/research/health/pm-mort/PMmortalityreportFINALR10-24-08.pdf

[4] https://www.epa.gov/statelocalenergy/co-benefits-risk-assessment-cobra-health-impacts-screening-and-mapping-tool

Tool	Created by	Description	Resolution	Pollutants Analyzed	Project-Level CEQA Applicability
		"canned" source-receptor matrix model to estimate PM changes and resulting health outcomes and monetized values. The results can be mapped to visually represent air quality, human health, and health-related economic benefits. Analysis can be performed across the 14 major emissions categories included in the EPA's National Emissions Inventory. Note that COBRA is based on EPA's BenMAP-CE (discussed in a separate entry).			is **not recommended** for project-level CEQA analysis.
Environmental Benefits and Mapping Program-Community Edition (BenMAP-CE)[5]	US EPA	BenMAP is EPA's detailed model for estimating the health impacts from air pollution. It relies on input concentrations and applies concentration-response (C-R) health impact functions, which relate a change in the concentration of a pollutant with a change in the incidence of a health endpoint, including premature mortality, heart attacks, chronic respiratory illnesses, asthma exacerbation and other adverse health effects. Detailed inputs are required for air quality changes (concentrations from AERMOD), population, baseline incidence rates, and effect estimates.	National, County, City, and sub-regional levels	Ozone, PM, NO_2, SO_2, CO	The smallest default analysis resolution for BenMAP-CE is 144 square kilometers (equivalent to approximately 56 square miles or 36,000 acres). This tool could be used to derive average health incidence/ton estimates that can be used for illustrative purposes only for most projects with proper disclosure of the inherent inaccuracies involved in averaging. It is **not recommended** for individual modeling of smaller projects, however. The tool may be appropriate for certain large-scale planning-level analyses.

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[5] https://www.epa.gov/benmap

Tool	Created by	Description	Resolution	Pollutants Analyzed	Project-Level CEQA Applicability
Fast Scenario Screening Tool (TM5-FASST)[6]	Joint Research Centre (Italy)	Tool allows users to evaluate how air pollutant emissions affect large scale pollutant concentrations and their impact on human health (mortality and years of life lost) and crop yield from national to regional air quality policies, such as climate policies. The tool is web-based and does not require coding or modelling. Users must gain access through publishers.	Global and national-levels	PM2.5, ozone, NOx, NH_3, CO, ROG, EC, CH_4, SO_2	This tool is applicable at national to global scales. Accordingly, the tool is **not recommended** for project-level CEQA analysis.
Long-range Energy Alternatives Planning System--Integrated Benefits Calculator (LEAP-IBC)	Climate and Clean Air Coalit-ion (CCAC)	Allows users to rapidly estimate the impacts of reducing emissions on health, climate, and agriculture. Tool uses sensitivity coefficients that link gridded emissions of air pollutants and precursors to health, climate and agricultural impacts at a national level. The sensitivity coefficients are generated by a chemical transport model, so air quality modeling not necessary. Tool is currently Excel-based and is available through the developers only. A web-based interface is currently under development.	National-level	PM2.5, ozone, NO_2	This tool is applicable at national scale. Accordingly, the tool is **not recommended** for project-level CEQA analysis.
Multi-Pollutant Evaluation Method (MPEM)[7]	BAAQMD	Estimates the impacts of control measures on pollutant concentration, population exposures, and health outcomes for criteria, toxic, and GHG pollutants. Monetizes the value of total health benefits from reductions in PM2.5, ozone, and certain carcinogens, and the social value of GHG reductions. MPEM was designed for development of a Clean Air Plan for the San Francisco Bay Area. The inputs are specific to the SF region and are not appropriate for projects outside BAAQMD.	Regional level in the SFBAAB	Ozone, PM, air toxics, GHG	This tool is designed to support the BAAQMD in regional planning and emissions analysis within the SFBAAB. The model applies changes in pollutant concentrations over a four-square kilometer grid. This tool could be used to derive average health incidence/ton estimates that can be used for illustrative purposes only for

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[6] http://tm5-fasst.jrc.ec.europa.eu/

[7] http://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/mpem_nov_dec_2016-pdf.pdf?la=en

Tool	Created by	Description	Resolution	Pollutants Analyzed	Project-Level CEQA Applicability
					most projects with proper disclosure of the inherent inaccuracies involved in averaging. It is **not recommended** for individual modeling of smaller projects, however. The tool may be appropriate for certain large-scale planning-level analyses in the SFBAAB (with permission of BAAQMD).
Response Surface Model (RSM)-based Benefit-per-Ton Estimates[8]	US EPA	Consists of tables reporting the monetized PM2.5-related health benefits from reducing PM2.5 precursors from certain source types nationally and for 9 US cities/regions. Applying these estimates simply involves multiplying the emissions reduction by the relevant benefit per-ton metric. The resulting value is the PM mortality risk estimate at a 3% discount rate. Note that RSM is based on EPA's BenMAP-CE (discussed in a separate entry).	National or regional (San Joaquin County only) levels	EC, SOx, VOC, NH_3, NOx	While RSM includes regional values specific to San Joaquin County, the metrics only reflect the benefits of reductions in exposure to ambient PM alone and do not include the benefits of reductions in other pollutants. The values are also dated as new sector-based BPT values are more current. Accordingly, the tool is **not recommended** for project-level CEQA analysis (even in San Joaquin County).

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[8] https://www.epa.gov/benmap/response-surface-model-rsm-based-benefit-ton-estimates. Note that the tables with the RSM values shown in this link break down BPT by sector and region and are from Fann's 2009 study, which is now outdated. However, the values in EPA's 2018 Technical Support Document do include updated Values of Statistical Life (United States Environmental Protection Agency 2018).

Tool	Created by	Description	Resolution	Pollutants Analyzed	Project-Level CEQA Applicability
Sector-based Benefit-per-Ton Estimates[9]	US EPA	Two specific sets of BPT estimates for 17 key source categories are available. Both are a reduced-form approach based on BenMAP modeling. The first are based on Fann et al. (2012) values and available from EPA's website. The second is based on updated modeling from Fann et al. (2017) and available in a Technical Support Document (TSD) from EPA. Applying these factors involves multiplying the emissions reduction (in tons) by the relevant benefit (economic value) or incidence (rates of mortality and morbidity) per-ton metric. The resulting value is the economics, mortality, and morbidity of direct and indirect PM2.5 emissions. All values are based on a national-scale study. Local values are preferred, but not available from any existing reduced form model and use of reduced form estimates for another city is unlikely to provide a better-than-national value. Use of the current values from EPA's 2018 TSD represent the most current estimate of monetized or incidence risk. Values from Lepeule et al. (2012) represent the most current estimate of mortality.	National-scale	PM2.5, SO_2, NOx	Due to the complex non-linear chemistry governing ozone formation, EPA was not able to derive ozone or secondary PM BPT values. The BPT estimates provide a rough order-of-magnitude analysis of health consequences from directly-emitted PM and precursors to PM (with no secondary formation). However, the multipliers do not account for project-specific characteristics, receptor locations, or local dispersion characteristics. The resultant health effects are therefore reflective of national averages and may not be exact when applied to the project-level. Nonetheless, the estimates can be used to present an informational and scaled health risk analysis of directly-emitted PM and precursors to PM (with no secondary formation.

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[9] https://www.epa.gov/benmap/sector-based-pm25-benefit-ton-estimates. The updated Technical Support Document (February 2018) is available at: https://www.epa.gov/sites/production/files/2018-02/documents/sourceapportionmentbpttsd_2018.pdf.

Appendix B

San Francisquito Tree Impacts

September 26, 2018

HORT SCIENCE
BARTLETT CONSULTING
A Division of The F.A. Bartlett Tree Expert Company

Kevin MacKay
ICF
201 Mission St., Suite 1500
San Francisco, CA 94105

Subject: San Francisquito Tree Impacts

Dear Kevin MacKay,

ICF is planning a bank stabilization project along the San Francisquito Creek. You asked HortScience | Bartlett Consulting to assess 15 trees on private property that may be impacted by the construction. You and I were together in the field to identify which trees were included in the assessment.

Summary

In total, I assessed fifteen (15) large trees on five properties that you identified as potentially affected by the bank stabilization project.

Tree impacts are expected to be limited to root damage from shallow excavations near the top of the bank to remove the existing sacked concrete (Sakrete) atop the creek bank and to build a new retaining wall. For most trees this process should result in no or very little injury (Table 1). Some trees growing within 10 feet of the top of bank may have roots at the interface between the soil and the sakrete that would be affected by excavations.

It is difficult to predict impacts to four trees:

- For the property 79 Crescent Drive (trees #8-10) the property boundary and construction plans have not been determined.
- Tree #15 at 63 Cresent Dr. was growing close to a masonry wall. I did not have access to the creek side of the masonry wall to determine the distance from the tree to the top of bank.

Table 1. Tree Disposition Data

Tag #	Species	Diameter (in.)	Disposition	Distance from impact
1	Blue gum	81	Preserve	12 feet from top of bank
2	Blue gum	55	Preserve	4 feet from top of bank
3	Blue gum	64	Preserve	Approx. 10 feet from top of bank
4	Blue gum	41	Preserve	Approx. 10 feet from top of bank
5	Blue gum	53	Preserve	Approx. 10 feet from top of bank
6	Blue gum	64	Preserve	Approx. 10 feet from top of bank
7	Blue gum	112	Preserve	Approx. 20 feet from top of bank
8	Coast live oak	32	Depending on plans	Approx. 10 feet from top of bank
9	Coast redwood	35	Depending on plans	7 feet from top of bank
10	Blue gum	36	Depending on plans	Adjacent to top of bank
11	Coast redwood	45	Preserve	6 feet from masonry wall
12	Coast live oak	14	Preserve	7 feet from masonry wall
13	Coast live oak	13	Preserve	11 feet from masonry wall
14	Coast live oak	34	Preserve	14 feet from masonry wall
15	Coast redwood	48	Depending on plans	1 foot from masonry wall

I recommend an arborist observe excavation and sakrete removal along the top of bank to document root damage and to determine if any trees require removal or further mitigation.

Tree Assessment Methods

Trees were assessed on September 13, 2018. ICF determined which trees were included. The identified trees were primarily large trees, near the top of the creek bank, with a potential to become destabilized due to possible root interference during construction. The assessment procedure consisted of the following steps:

1. Identifying the tree as to species;
2. Tagging each tree with an identifying number and recording its location on a map; off-site trees were not tagged;
3. Measuring the trunk diameter at a point 54" above grade
4. Evaluating the health and structural condition using a scale of 1 – 5 based on a visual inspection from the ground. Portions of trees not visible from the ground could not be assessed and are not included in the rating:

   5 **-** A healthy, vigorous tree, reasonably free of signs and symptom of disease, with good structure and form typical of the species.
   4 **-** Tree with slight decline in vigor, small amount of twig dieback, minor structural defects that could be corrected.
   3 **-** Tree with moderate vigor, moderate twig and small branch dieback, thinning of crown, poor leaf color, moderate structural defects that might be mitigated with regular care.
   2 **-** Tree in decline, epicormic growth, extensive dieback of medium to large branches, significant structural defects that cannot be abated.
   1 **-** Tree in severe decline, dieback of scaffold branches and/or trunk; most of foliage from epicormics; extensive structural defects that cannot be abated.

5. Rating the suitability for preservation as "high", "moderate" or "low". Suitability for preservation considers the health, age and structural condition of the tree, and its potential to remain an asset to the site for years to come.

High:	Trees with good health and structural stability that have the potential for longevity at the site.
Moderate:	Trees with somewhat declining health and/or structural defects that can be abated with treatment. The tree will require more intense management and monitoring, and may have shorter life span than those in 'high' category.
Low:	Tree in poor health or with significant structural defects that cannot be mitigated. Tree is expected to continue to decline, regardless of treatment. The species or individual may have characteristics that are undesirable for landscapes and generally are unsuited for use areas.

Properties Visited

We visited nine properties in Palo Alto, CA. Several smaller trees may be affected as well. In four properties no trees were assessed because no large trees were growing near the creek.

- 1401 Edgewood Drive – Trees #1 and 2
- 1411 Edgewood Drive – Trees #3-6
- 1417 Edgewood Drive – Tree #7
- 1425 Edgewood Drive – No trees assessed

- 87 Crescent Drive – No trees assessed
- 79 Crescent Drive – Trees #8-10
- 75 Crescent Drive – No trees assessed (#10 is near boundary)
- 63 Crescent Drive – Trees #12-15
- 51 Crescent Drive – No trees assessed

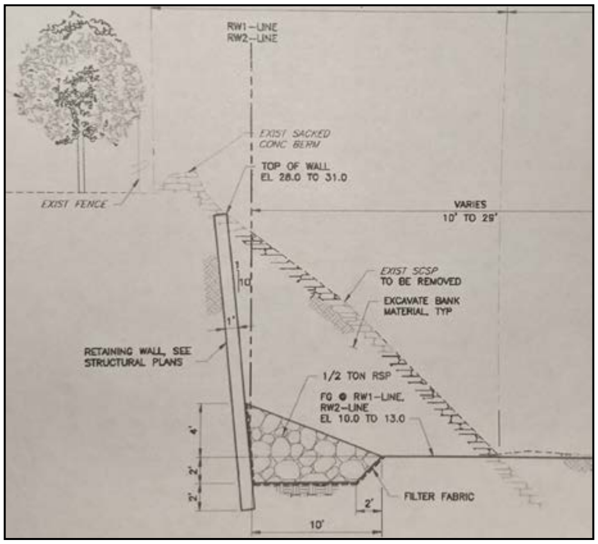

Figure 1. Construction plans showing existing sakrete and future retaining wall.

Construction Impacts

The majority of the sites that we visited had slopes covered with sakrete that was to be replaced with retaining walls (Figure 1). The sakrete will be removed. Minimal excavation will take place at the top of the bank during sakrete removal. A new near-vertical retaining wall will be built which will require significant excavation lower on the slope. Most of the existing slopes that I observed were steeper than that illustrated in Fig. 1, and so would require less excavation. Twenty-five (25) foot long soil nails will be drilled into the slope at a downward slope angle of 15º. The closest nail to the surface will be five feet below top of slope.

At 87 Crescent Drive sakrete will be added to the top of the existing sakrete, and no excavation will be required. Rebar will be pounded into the ground to attach the new sakrete to the slope. No trees were identified for assessment at 87 Crescent Drive.

At 79 Crescent Drive a concrete retaining wall already exists rather than sakrete. No construction is planned in this area at this time.

Tree impacts are expected to be limited to root damage from shallow excavations near the top of the bank to remove the sakrete atop the creek bank and to and build the new retaining wall. For most trees this process should result in no or minor injury. Some trees growing within 10 feet of the top of bank may have roots at the interface between the soil and the sakrete that would be affected by excavations.

It is difficult to predict impacts to four trees:

- For the property 79 Crescent Drive (trees #8-10) the property boundary and construction plans have not been determined.
- Tree #15 is growing in close proximity to a masonry wall. I did not have access to the creek side of the masonry wall to determine the distance from the tree to the top of bank.

Installation of the soil nails are of minimal concern because the highest nail will be installed approximately 5 feet below grade. The equipment will drill an 8 inch- diameter hole approximately 25 feet in length into the bank at a downward slope of 15º. The nails will be spaced 5 feet on center in a grid pattern.

Most tree roots are found in the top 3 feet of soil. So, at 5 feet deep, it is unlikely that significant root damage would occur that would destabilize or kill a tree. It is possible that the roots growing near the interface of the soil and sakrete will be within the pathway of a soil nail. I recommend noting these roots during excavation and adjusting soil nails to avoid them.

Equipment access and operations needs to consider surrounding vegetation. I assume that the equipment needed to construct the wall will be working from the creek bed and require no additional clearance or tree removal on private property. Similarly, I was told that the crews will pound rebar at 87 Crescent Drive by hand and require no large equipment, nor tree crown pruning will be needed to complete construction.

Site-Specific Trees and Construction

Tree descriptions are provided in the attached Tree Assessment table.

1401 Edgewood Drive

Two mature blue gums (*Eucalyptus globulus*) were assessed at 1401 Edgewood Drive. Tree #1 was 81” in diameter and 12 feet from the top of the bank. Tree #2 was 55” and 4 feet from the top of the bank. Both trees had been topped and were in poor condition with extensive epicormic growth (Photo 1).

Photo 1. Blue gums #1 and 2 were growing in the backyard of 1401 Edgewood Drive.

Both trees are likely to experience some root loss during excavation near the top of the bank. Because of its close proximity to the creek, tree #2 is of greater concern. I think that both trees will survive construction and will not be destabilized by excavation. I recommend an arborist observe excavation to document root loss and provide mitigation recommendations based on those observations.

1411 Edgewood Drive

Four mature blue gums were assessed (trees #3-6) at 1411 Edgewood Drive. The four trees had trunk diameters ranging from 41” to 64” and were approximately 10 feet away from the top of creek bank. The trees were in fair condition except for tree #6 with tall, difficult to see crowns and their bases fused together. Tree #6 was in poor condition with a 4 foot wide cavity and large basal flare growing over the pavement.

The four trees will likely have some root loss associated with the construction. I expect root loss of trees #3-6 to be minor; an arborist should monitor excavation to see what root loss does occur.

Photo 2. Blue gums #7 was the largest tree assessed (112” trunk diameter).

1417 Edgewood Drive

The largest tree assessed (tree #7) was growing in the backyard of 1417 Edgewood Drive (112” trunk diameter). It appeared to be in good condition, but the upper crown was difficult to see (Photo 2). It was approximately 20 feet from the top of the bank of the creek. If tree #7 loses any roots, I expect it to be minor; an arborist should monitor excavation.

79 Crescent Drive

Three trees were assessed (trees #8-10) at 79 Crescent Drive. Tree #8 was a 32” coast live oak (*Quercus agrifolia*) in poor condition with decay fungus fruiting bodies and a heavy lean and old prop (Photo 3). Tree #9 was a 35” coast redwood (*Sequoia sempervirens*) in good condition. Blue gum #10 had a trunk diameter of approximately 36” and was growing at the corner of the property at the intersection of three fences. The fences were not on the property boundaries, and tree ownership was uncertain in the field. Construction plans are not certain at the time of this writing. Therefore, potential impacts to trees could not be adequately assessed.

63 Crescent Drive

Five trees were assessed (trees #11-15) at 63 Crescent Drive. Coast redwood #11 had a trunk diameter of 45” and was in fair condition with signs of water stress. Tree #11 was 6 feet from the masonry wall. Coast live oaks #12-14 had trunk diameters of 14, 13 and 34” respectively. Tree #12 was the closest to the masonry wall (7 feet) with the others growing in a row behind. The coast live oaks were in fair condition and were heavily bowed either towards the creek (trees #12 and 13) or away from the creek (tree #14). Coast redwood #15 had a trunk diameter of 48” and was in good condition with a dense crown (Photo 4). Tree #15 was 1 foot away from the masonry wall.

Access was not available on the creek side of the masonry wall to see how far the trees are from the top of bank. The two unknowns are:

- How far is the wall from the top of bank?
- What is the footing of the wall and extent of roots growing under it?

Assuming that excavation will take place near the masonry wall and roots can freely grow underneath the wall, impacts to trees will range from none (tree #14) to potentially severe (tree #15). Trees #13 and 14 should not be impacted by construction. Trees #11 and 12 will likely experience minor to severe root loss. Tree #15 may be 1 or 2 feet from the excavation which has the chance of destabilizing or killing the tree.

I recommend an arborist observe excavation near trees #11, 12 and 15 to document root loss and provide mitigation recommendations.

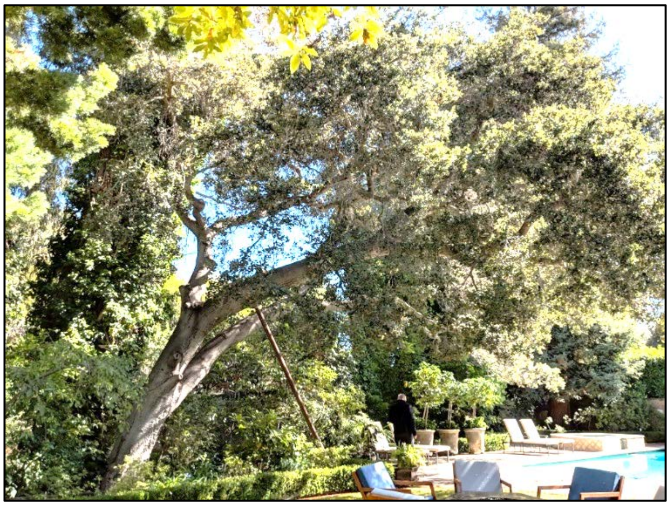

Photo 3 (above). Coast live oak #8 was leaning heavily and being partially supported by a prop. **Photo 4 (right).** Coast redwood #15 was 1 foot from the masonry wall and may experience severe root impacts.

Tree Preservation Guidelines

The goal of tree preservation is not merely tree survival during development but maintenance of tree health and beauty for many years. Trees retained on sites that are either subject to extensive injury during construction or are inadequately maintained become a liability rather than an asset. The response of individual trees will depend on the amount of excavation and grading, the care with which demolition is undertaken, and the construction methods. Coordinating any construction activity inside the **TREE PROTECTION ZONE** can minimize these impacts.

The following recommendations will help reduce impacts to trees from development and maintain and improve their health and vitality through the clearing, grading and construction phases.

1. The demolition and construction superintendents shall meet with the Project Arborist before beginning work to review all work procedures, access routes, storage areas, and tree protection measures.
2. The Project Arborist shall monitor excavation and removal of sakrete as well as and drilling for soil nails within 25 feet of the 15 trees included in this assessment.
3. If roots 2" and greater in diameter are encountered during site work and must be cut to complete the construction, the Project Arborist must be consulted to evaluate effects on the health and stability of the tree and recommend treatment.
4. Sakrete within 25 feet of trees shall be removed with equipment that will minimize damage to trees above and below ground, and operate from outside the dripline of the trees.
5. All contractors shall conduct operations in a manner that will prevent damage to trees to be preserved.
6. If injury should occur to any tree during construction, it should be evaluated as soon as possible by the Project Arborist so that appropriate treatments can be applied.
7. No excess soil, chemicals, debris, equipment or other materials shall be dumped or stored within the dripline of any trees.
8. Any additional tree pruning needed for clearance during construction must be performed by a Certified Arborist and not by construction personnel.

This report summarizes my observations and comments which are limited to the planned project work. Tree owners are encouraged to have their trees inspected regularly to assess tree conditions and to provide appropriate treatments to enhance health and structural stability. In particular, owners of large blue gum trees are advised to consider having aerial inspections by a climbing arborist to assess the structure of the tree crown that is not visible from the ground. Where internal decay indicators are present, such as tree #6 at 1411 Edgewood Dr. and tree #8 at 79 Crescent Dr., the owners are advised to have an advanced inspection to assess the extent of decay and its effects on tree stability. Pruning to manage weight distribution on mature trees is an important part of tree management and is the responsibility of the owner.

Our procedures included assessing trees for observable, visible defects. This is not to say that trees without significant defects will not fail. Failure of apparently defect-free trees does occur, especially during storm events. Wind forces, for example, can exceed the strength of defect-free wood causing branches and trunks to break. Wind forces coupled with rain can saturate soils, reducing their ability to hold roots, and blow over defect-free trees.

Furthermore, trees change over time. Our inspections represent the condition of the tree at the time of inspection. Annual tree inspections are recommended to identify changes to tree health and structure. In addition, trees should be inspected after storms of unusual severity to evaluate damage and structural changes. Initiating these inspections is the responsibility of the tree owner.

Please contact me if you have any questions regarding my observations or recommendations.

Sincerely,

Ryan Gilpin
Certified Arborist WE-10268A

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Tree Assessment Map

San Francisquito Creek
Palo Alto, CA

Prepared for:
ICF

September 2018

Notes:
1. Tree locations are approximate.

2. Aerial image provided by ESRI.

Legend

○ Tree

▭ Parcel

N

100
Feet

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325 Ray Street Phone (925) 484-0211
Pleasanton, CA 94566 Fax (925) 484-0596

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Tree Assessment Map

San Francisquito Creek
Palo Alto, CA

Prepared for:
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Legend

○ Tree

🟥 Parcel

N

100

Feet

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Tree No.	Species	Trunk Diameter (in.)	Protected Tree?	Condition 1=poor 5=excellent	Suitability for Preservation	Comments
1401 Edgewood Drive						
1	Blue gum	81	No	2	Low	Multiple trunks arise from 5 feet; topped at 25 feet; bushy epicormic regrowth.
2	Blue gum	55	No	2	Low	Multiple trunks arise from 20 feet; topped at 30 feet; bushy epicormic regrowth.
1411 Edgewood Drive						
3	Blue gum	64	No	3	Moderate	Group of 4 trees; bases fused together with massive burls; branch from adjacent tree pushing against trunk; circling root; upright high crown.
4	Blue gum	41	No	3	Moderate	Group of 4 trees; bases fused together with neighboring trees; codominant trunks arise from 20 feet; tall; upright crown; difficult to see top of tree.
5	Blue gum	53	No	3	Low	Group of 4 trees; bases fused together with neighboring trees; tall; upright crown; difficult to see top of tree; basal flare extends over pavement 1 foot in 3 foot wide.
6	Blue gum	64	No	2	Low	Group of 4 trees; bases fused together with neighboring trees; tall; upright crown; slightly thin; long heavy branches; basal flare extends over pavement 2 feet by 3 foot wide; four foot wide cavity at base from driveway damage.
1417 Edgewood Drive						
7	Blue gum	112	No	4	High	Huge tree; growing in mounded ivy; root pruning relatively well healed on creek side; bushy lower growth; wide spreading crown slightly one sided towards creek.

Tree No.	Species	Trunk Diameter (in.)	Protected Tree?	Condition 1=poor 5=excellent	Suitability for Preservation	Comments
79 Crescent Drive						
8	Coast live oak	32	Yes	2	Low	Codominant trunks arise from 10 feet; one side propped with growth around it; bleeding; fungal fruiting body (Ganoderma lucidum); crown one sided over pool away from creek; buried and then dug out.
9	Coast redwood	35	Yes	4	High	Good form and structure; dense crown; slightly poor color; slightly thin top; narrow form.
10	Blue gum	36	No	2	Low	At corner of property; multiple trunks arise from 10 feet; bushy; covered in ivy; hard to see much of tree.
63 Crescent Drive						
11	Coast redwood	45	Yes	3	Moderate	Good form and structure; dense foliage; narrow branches; dark green color.
12	Coast live oak	14	Yes	3	Low	Bowed heavily over creek; corrected past other trees crowns; dieback; dense crown.
13	Coast live oak	13	Yes	3	Low	Bowed heavily over creek; dieback; dense crown; growth cracks; interior tree.
14	Coast live oak	34	Yes	3	Low	Bowed heavily away from creek; epicormic growth; dense crown; growth cracks; dominant tree.
15	Coast redwood	48	Yes	4	High	Good form and structure; dense crown; dark green color; epicormic sprouting around base.

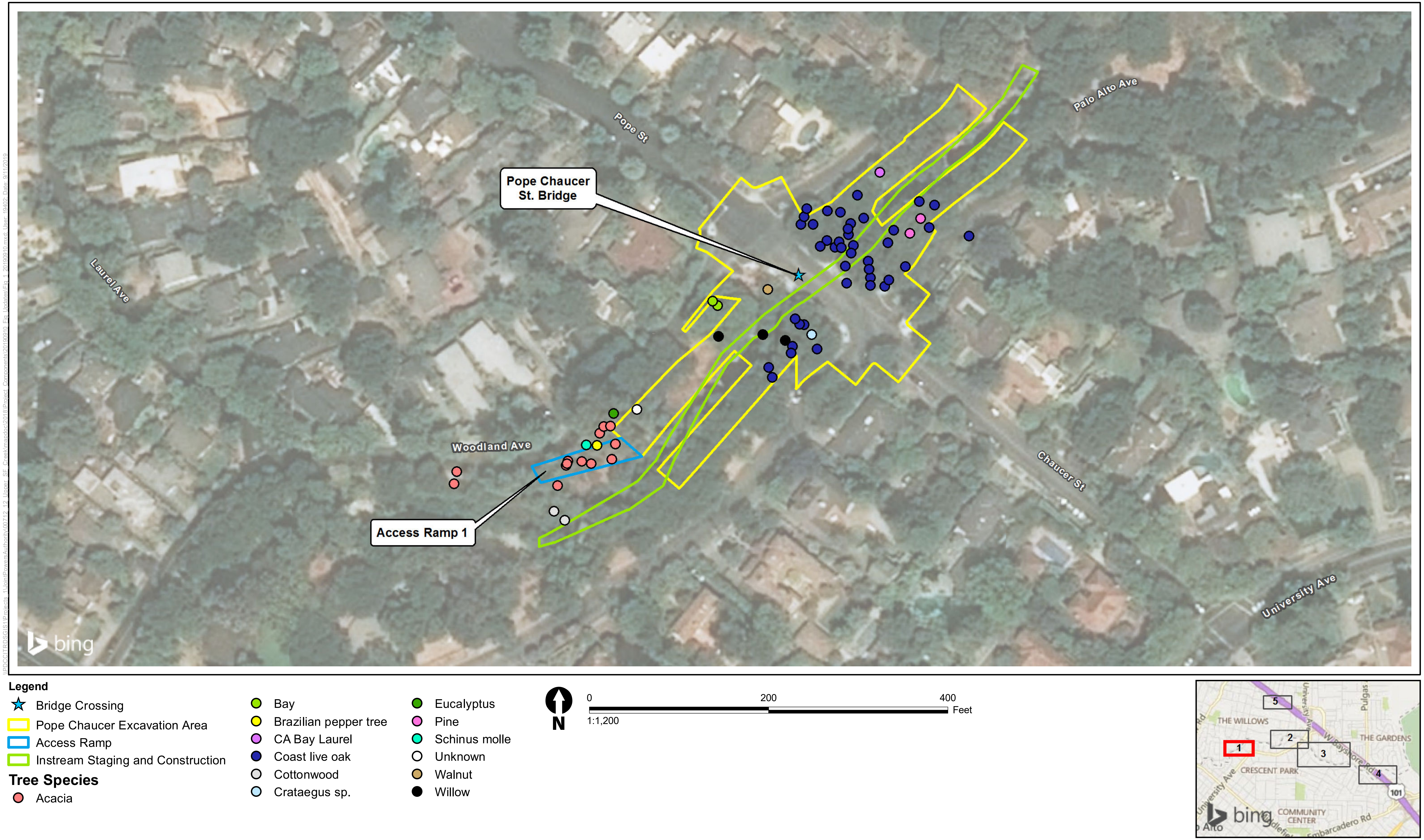

Figure 1
Access Ramp 1

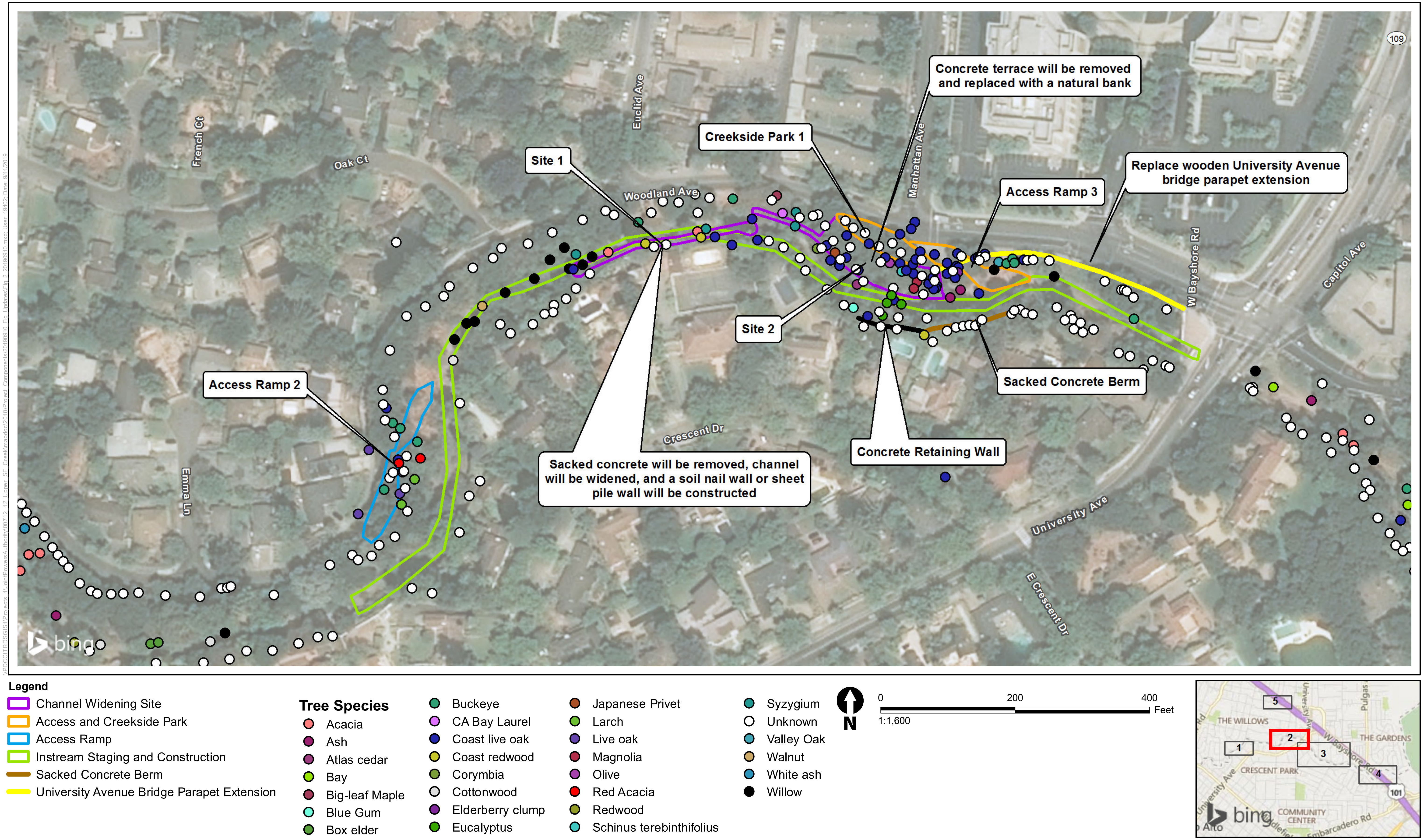

Figure 2
Site 1 and 2 Construction Elements

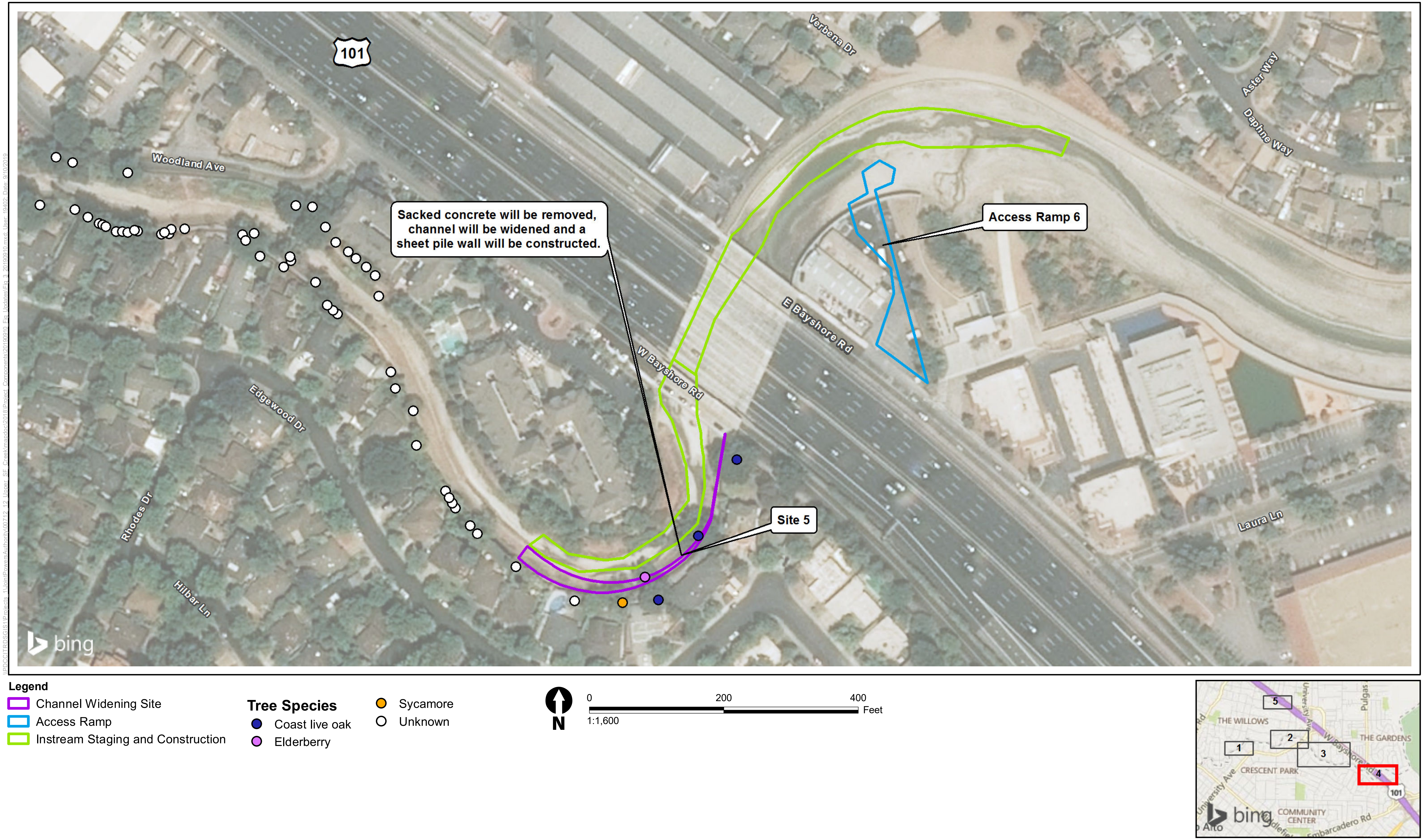

Figure 3
Site 5 Construction Elements

Appendix C

Cultural Resources Pedestrian Survey

Memorandum

To:	Ruzel Ednalino, M.A. Archaeologist USACE San Francisco District
From:	Lily Arias, MA Archaeologist ICF
Date:	February 19, 2019
Re:	**Cultural Resources Pedestrian Survey for the San Francisquito Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101**

This memorandum is to document the pedestrian survey conducted as part of the cultural resources review for the Draft Environmental Impact Report (DEIR) of the San Francisquito Creek Joint Powers Authority's (SFCJPA) San Francisquito Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101 (project).

For the DEIR, San Francisquito Creek is described in three reaches. Reach 1 extends from San Francisco Bay to the upstream side of U.S. 101. The SFCJPA has completed construction of flood protection improvements in Reach 1; CEQA documentation was completed in 2012 and this Reach 1 is not included in this memorandum. Given program-level improvements are still early in the planning phase and, therefore, conceptual in nature, the reaches are categorized as program-level improvements and project-level improvements. Project-level improvements include construction activities associated with Reach 2, which extends from the upstream side of U.S. 101 to the upstream side of the Pope-Chaucer Bridge. Reach 2 is the subject of this memorandum. Program-level improvements include construction activities associated Reach 3, which begins on the upstream side of the Pope-Chaucer Bridge and extends throughout the upper watershed. Project-level improvements for Reach 3 have not been defined and Reach 3 is not included in this memorandum. Only Reach 2 was subject to pedestrian survey (Figure 1).

Methods

Records Search

A records search was performed at the Northwest Information Center in Rohnert Park, California, on November 28, 2017 (IC#17-1496). The search identified 55 previously recorded resources, with one located within the Reach 2 study area, in an area of proposed channel widening.

P-43-000578 (CA-SCL-583) – This resource was originally identified in the 1960s, and three human burials were removed from the area along with associated funerary items, such as several hundred Olivella beads, several hundred fraction Olivella beads, bird bone whistle, bone awl, and cut and polished bone tube. This material is curated at the Stanford Museum. The resource was revisited in 1985 at which time a formal Department of Parks and Recreation (DPR) 523 form was completed. At this time, houses had been constructed on top of the resource and additional identification was not possible (Bocek and Rutherford 1985). This resource has not been formally evaluated for its eligibility for listing in the CRHR or NRHP.

A three-step process was followed to identify historic built resources and update existing evaluations: (1) undertake background research of previously recorded resources and completed reports within and adjacent to the study area, (2) develop approach and historic context for evaluation, and (3) conduct onsite fieldwork to inspect and record resources. Additional desktop research was conducted at the Palo Alto Historical Association website, newspapers.com, historicaerials.com, state, and national bridge inventories.

Field Survey

A pedestrian survey of the project-level study area was conducted on April 18, 2018, by both an ICF archaeologist and architectural historian, to identify historic age built environment resources, archaeological deposits and surface-exposed features. The archaeological survey consisted of walking across the project-level study area and visually inspecting the ground surface for indicators of surface and subsurface archaeological deposits. The archaeological survey also involved inspecting the local topography to identify areas that have been subject to modern anthropogenic landscape alteration.

The built environment survey consisted of walking the project-level study area and visually inspecting built resources for the potential to be age-eligible (50 years or older). Photographs were taken throughout the course of the survey.

Findings

As discussed above a records search conducted at the NWIC identified one precontact archaeological site within the project-level study area. P-43-000578 (CA-SCL-583) identified within Site 5 of Reach 2. This resource was not accessible during the pedestrian survey.

The pedestrian survey encompassed portions of the project-level study area adjacent to the University Avenue Bridge and the Pope-Chaucer Bridge, as well as 200 meter radius around the bridges.

The project-level study area was inspected for indicators of human activity such as dark midden soils, dietary shell and bone, stone or bone artifacts, and historic artifacts. The area was also examined for any larger, earthen features such as mounds or depressions. The area has been completely developed and consists of residential neighborhoods. The majority of the project-level study area is within the limits of the creek and includes steep banks and heavy vegetation. Any visible ground surface has been disturbed and/or covered in fill and gravel. All visible ground surfaces appear to have been graded, landscaped, or developed.

No archaeological resources were identified during the course of the pedestrian survey.

Two known built environment resources, The University Avenue Bridge and the Pope-Chaucer Street Bridge, were identified and revisited during the pedestrian survey. Photographs were taken of the two structures and a visual inspection of the bridges was conducted to note alterations and existing conditions.

No additional built environment resources were identified during the course of the pedestrian survey.

Conclusions

While no evidence of archaeological deposits was identified during the pedestrian survey, the potential remains that subsurface archaeological deposits are present in the project-level study area. Only a portion of the project-level study area was available for pedestrian survey and the area adjacent to the stream channel was heavily developed and vegetated. As described in Chapter 3.4 *Cultural and Paleontological Resources* of the DEIR over 55 archaeological sites have been identified within overall project area, the majority of which are situated along San Francisquito Creek. Additionally, the areas directly adjacent to the stream contain Holocene-aged alluvium that indicates that the project area has high archaeological sensitivity (Byrd and Meyer 2011; ICF 2018).

Chapter 3.4 *Cultural and Paleontological Resources* of the DEIR states that any ground disturbing activities occurring within Reach 2 have the potential to have significant impacts to documented and as-yet undocumented archaeological resources. The implementation of Mitigation Measures (MM-) CULT-1: *Stop Work if Archaeological Deposits are Encountered During Ground-Disturbing Activities*, MM-Cult-2: *Develop and Implement an Archaeological Testing Plan,* and MM- CULT-3: *Develop and Implement an Archaeological Monitoring Plan* would reduce the impacts to less than significant. Halting work in an area where potential archaeological resources, including human remains, are identified allows the resources to avoid further impact as well as allows for further analysis. All potential archaeological resources should be assessed by a qualified archaeologist to determine its significance under CEQA. If work is to occur within an area where an archaeological site is present, the creation and implementation of an Archaeological Testing Plan before construction activities begin, would allow for understanding of the extent of the resource as well as its significance under CEQA. Due to the highly sensitive nature of Reach 2, the creation and implementation of an

Archaeological Monitoring Plan in areas where project related ground disturbance has the potential to encounter as-yet undocumented archaeological resources would allow for the early identification of archaeological resources by qualified archaeologist and thus avoid destruction of the resource. These mitigation measures are discussed at length in Chapter 3.4 Cultural and Paleontological Resources of the DEIR (ICF 2018).

References

Byrd, F. B., and J. Meyer. 2011. *Initial Cultural Resources Investigation San Francisquito Creek Flood Damage Reduction and Ecosystem Restoration Project, Santa Clara and San Mateo Counties, California.*

ICF. 2018. *DRAFT Environmental Impact Report San Francisquito Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101*. Prepared for the San Francisquito Creek Joint Powers Authority.

Photographs

Overview of San Francisquito Creek, directly south of the University Avenue Bridge, view southeast

Overview of San Francisquito Creek, directly south of the University Avenue Bridge, view south

Overview of the north side of the Pope-Chaucer Bridge, view southwest

FIGURE REDACTED

Appendix D

Hydrology Report

Santa Clara Valley
Water District

SAN FRANCISQUITO CREEK HYDROLOGY STUDY

Hydraulics, Hydrology and Geomorphology Unit

FINAL (ADDENDUM #1)

Prepared by:

Jack Xu, PE
Associate Civil Engineer

Under the Direction of:

Liang Xu, Ph.D, PE
Engineering Unit Manager

DECEMBER 2016

ADDENDUM #1

An error was discovered after Corps ATR certification where the incorrect k-value was used to interpolate the 50-yr peak flows in the original report dated November 2015. The k-value was replaced in this addendum, which is dated December 2016. The only changes to the report are in the 50-yr column in Table 15. The changes are documented below.

Table 15: Design Flows (Addendum Updates)

Location	50-Yr Original (2015)	50-Yr Addendum (2016)
Searsville Inflow	3,880	3,700
Searsville Outflow	2,760	2,630
Bear Creek U/S SFC	2,670	2,570
Los Trancos U/S SFC	1,410	1,350
SFC U/S Los Trancos	5,750	5,500
USGS	7,010	6,710
Pope Chaucer	7,490	7,170
US-101	7,730	7,400
K-Value	1.77716	1.72033

The U.S. Army Corps of Engineers San Francisco District Water Resources Section was notified of the change, reviewed the update, and approved the addendum because there was a minimal adjustment to the 50-yr event flows that was determined insignificant.

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APPENDICES

Appendix A: Technical Memorandum - Effect of Searsville Lake on Large Storm Events. SCVWD. March 25, 2015.

Appendix B: US Army Corps of Engineers Agency Technical Review (ATR) Certification background documents.

Attached separately as electronic files

- HEC-RAS v5.0 BETA Searsville 2D Hydraulic Model
- HEC-HMS v4.0 San Francisquito Hydrologic Model
- SFC Flood Frequency Analysis PeakFQSA Output
- Balance Hydrologics Recorded Data Spreadsheet
- Hydrologic Parameters Spreadsheet
- Channel Routing Spreadsheet
- Design Rainfall Spreadsheet
- 2D Model Output Spreadsheet
- Model Plans Spreadsheet

1. INTRODUCTION

1.1. BACKGROUND

San Francisquito Creek forms the boundary of the Santa Clara Valley Water District's (SCVWD) jurisdiction to the north with San Mateo County. The watershed is approximately 45 square miles, with the majority of the watershed in the rural foothills of the San Francisco Peninsula. The Creek's watershed impacts the cities of Palo Alto, East Palo Alto, and Menlo Park. Stanford University is also a major landowner in the region and owns several reservoirs within the watershed.

San Francisquito has three main tributaries that combine to form the creek proper once it leaves the foothills and enters the urbanized valley. Bear Creek is the northernmost tributary and is unimpaired. To the south, Searsville Lake and Dam collect runoff from Alambique, Dennis Martin, Sausal, and Corte Madera Creeks. Searsville Lake offers some attenuation, but has experienced severe sedimentation over time. On the southeastern edge of the watershed, Los Trancos Creek flows unimpaired, passing Felt Lake, a diversion pond owned by Stanford. All three of these tributaries meet before traveling downstream toward the bay through urbanized neighborhoods.

A location map with information about the creek watershed and sub-watersheds is on Figure 1.

1.2. PURPOSE

The purpose of this report is to update the 2007 San Francisquito Hydrology Report[1] by improving the following items from the old report:

1. Upgrading the numerical model from HEC-1 to HEC-HMS v4.0.
2. Characterizing the routing effects of Searsville Lake and dam by using a 2D hydraulic model.
3. Using revised and improved methodology for design storms, loss, and Clark's hydrograph parameters (Tc & R).
4. Calibrating the numerical model to historical storms.
5. Performing a flood frequency analysis (FFA) on the USGS stream gage and validating the hydrologic design model to the FFA.

To do this, a new hydrologic model that reflects the existing San Francisquito Creek watershed was developed. This model will be used to determine revised 1% and 10% design flows for the entire creek.

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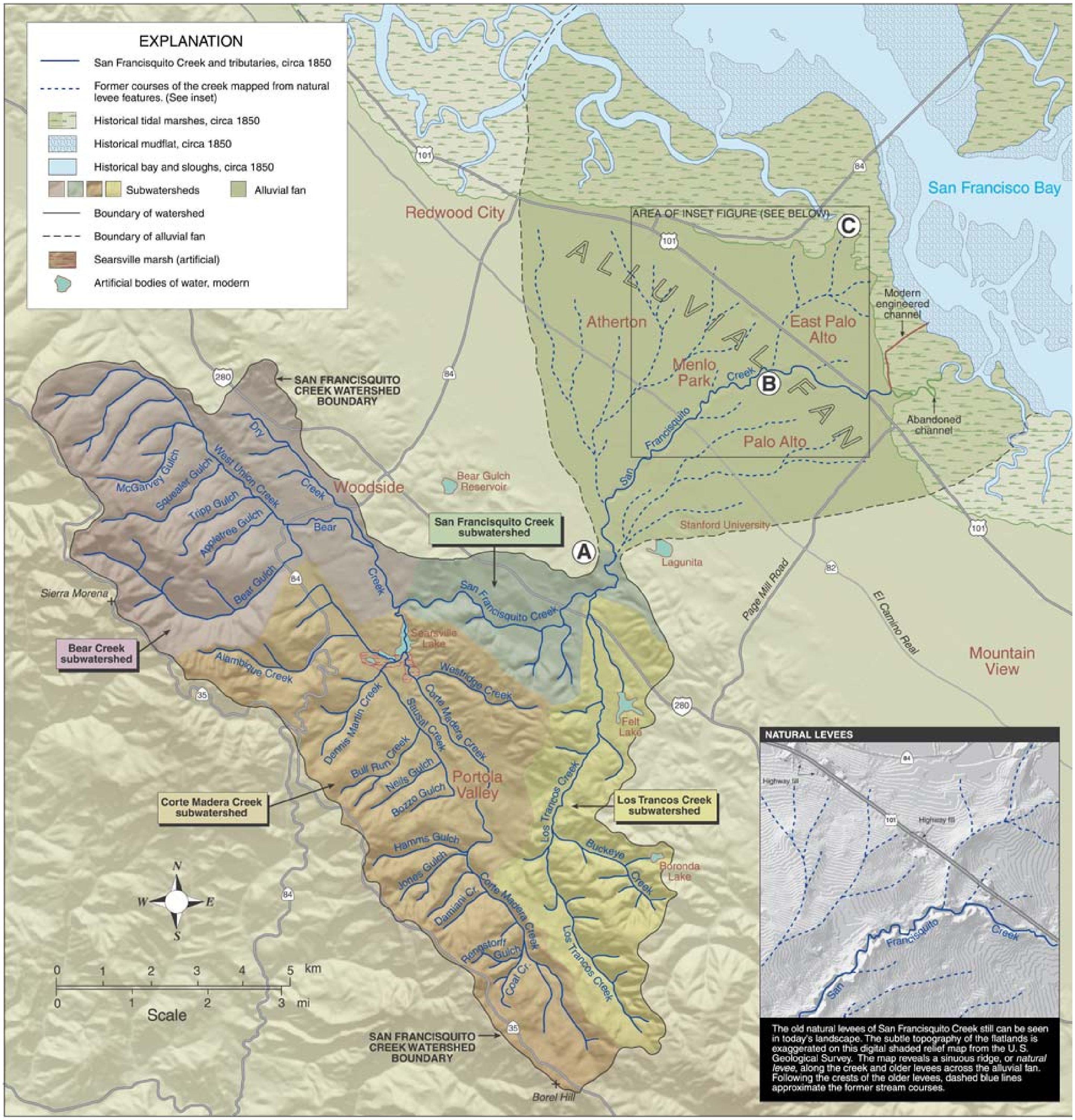
[1] Wang, James et al. SCVWD. San Francisquito Creek Hydrology Report. April 2006, Revised December 2007.



The old natural levees of San Francisquito Creek still can be seen in today's landscape. The subtle topography of the flatlands is exaggerated on this digital shaded relief map from the U. S. Geological Survey. The map reveals a sinuous ridge, or *natural levee*, along the creek and older levees across the alluvial fan. Following the crests of the older levees, dashed blue lines approximate the former stream courses.

Figure 1: San Francisquito Creek Watershed Map

2. MODEL INPUT PARAMETERS

2.1. WATERSHED DELINEATION

Sub-basin watershed delineation was performed by using the ArcHydro add-on to the original ArcGIS software suite. A digital elevation model (DEM) was created from two sources. For Santa Clara County, the 2006 LiDAR data was used, while for San Mateo County, USGS data was used. These elevation datasets were used to determine flow accumulation patterns and ultimately sub-basin delineations. Each sub-basin within an urban area was double checked manually to ensure that terrain features not picked up by the DEM were included, such as walls and levees. In addition, delineations were manually created at stream gage locations and dams.

Two delineated sub-basins were determined not to contribute to San Francisquito Creek flow. The first is the area tributary to Felt Lake. The second is the Stanford golf course.

2.2. SURFACE RUNOFF METHOD

The Army Corp's HEC-HMS hydrologic modeling software was used to perform this study. The Soil Conservation Service (SCS) Curve Number (CN) method was selected as the loss method, and Clark's Unit Hydrograph (CUH) was selected as the transform method. Since the model will primarily be used to determine design flow rates, it will be used as an event-based model, which is appropriate for the SCS loss method. The CUH method is robust for watersheds of different sizes and shapes. Based on previous experiences, the SCS method combined with CUH transform method works well within the Santa Clara Valley Watershed. This method has been used on studies in adjacent Matadero and Steven's Creek watersheds[2], as well as studies in the nearby Saratoga and San Tomas Creek watersheds[3], all of which have drainage areas from 20 to 45 square miles.

2.3. SUB-BASIN PARAMETERS

Six different variables; (2.3.1) Area, (2.3.2) Initial Abstraction, (2.3.3) Curve Number (CN), (2.3.4) Impervious Area, (2.3.5) Time of Concentration, and (2.3.6) Reach Coefficients must be characterized for each sub-basin and are listed below in further detail.

2.3.1. AREA

This is defined as the total area of the sub-basin in square miles. It is determined from area measurements performed in ArcGIS.

2.3.2. INITIAL ABSTRACTION

Initial abstraction represents the initial loss on each sub-basin, and also has bearing on the runoff equation used in HEC-HMS for CN method. The default relationship outlined in the SCS CN loss method is that initial abstraction is 20% of sub-basin storage. However, recent

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[2] SCVWD. Lower Peninsula Watershed Hydrology Report. July 2004, revised December 2007.

[3] SCVWD. Hydrology Report – Saratoga and San Tomas Aquino Creeks. May 8, 2013.

research[4],[5] suggests that 5% is a more appropriate value. Storm calibrations within this model have also supported the 5% value suggested by Hawkins and Lim et al. The initial abstraction used for rural sub-basins is defined by:

$$Initial\ Abstraction = 0.05 \times \left(\frac{1000}{CN} - 10\right)$$

While changing the initial abstraction for the SCS CN method, proper procedure dictates that the CN be modified as well, since HEC-HMS adjusts rainfall excess based on initial abstraction, and initial abstraction is related to the sub-basin storage index (S) that was fixed using a 20% ratio during the development of the SCS method. Since S is directly related to CN, the CN number would need to be adjusted as well if the ratio was changed to 5%. However, calibrations suggested that overall volume was matching observations without adjusting CN.

2.3.3. CURVE NUMBER (CN)

Curve number represents the pervious sub-basin characteristic for surface runoff. Internal parameters of curve number are; soil group, land cover type, and antecedent moisture condition (AMC). Curve number development was performed in accordance with a District memorandum[6] on SCS CN determination.

2.3.4. IMPERVIOUS AREA

Impervious area characterizes the amount of area, in percent, within the sub-basin that will experience negligible loss. These areas are generally considered paved urban areas. This value is based on the 2006 National Land Cover Dataset (NLCD) and is aggregated for each sub-basin in ArcGIS.

For watersheds with large amounts of urban areas, an impervious area reduction is commonly used to account for unconnected impervious areas. However, due to the majority rural makeup of the San Francisquito watershed, a reduction was not used.

---

[4] Kyoung Jae Lim, et al. Effects of Initial Abstraction and Urbanization on Estimated Runoff Using CN Technology. June 2006. Journal of the American Water Resources Association.

[5] Hawkins, Richard H. Woodward, Donald E. Runoff Curve Number Method: Examination of the Initial Abstraction ratio. 2002.

[6] Xu, Jack. SCVWD Technical Memorandum. SCS Curve Number Determination, Update #1. January 10th, 2015.

2.3.5. TIME OF CONCENTRATION (Tc)

Time of concentration is the maximum travel time for each sub-basin. The velocity method described in NEH Chapter 15[7] was used to determine time of concentration. General guidelines used by the District are outlined in a technical memorandum[8] on this subject.

In general, possible collectors and collector combinations were categorized into similar slopes and cross sections. A reiterative process was used to solve manning's equation for velocity, given a certain flow depth. The flow depth was determined from a given flow rate that was selected based on USGS regression equations. The equations serve as a broad estimation of the flow for different recurrence events given the sub-basins characteristics. Therefore, several times of concentrations for each sub-basin were developed, depending on the flow.

2.3.6. STORAGE COEFFCIENT (R)

The storage coefficient represents the amount of storage and attenuation that will not be lost within the sub-basin for the CUH method. This variable will change the shape of the runoff hydrograph. Studies[9] have shown that the storage coefficient ratio remains constant over a large watershed area:

$$Ratio = \frac{R}{R + Tc}$$

A ratio above 0.5 implies more storage and a wider hydrograph with a smaller peak flow. A ratio below 0.5 implies a narrow response with a larger peak flow. This value is held constant for each general topographic area within the Coyote Watershed for all calibration events. For the entire San Francisquito Creek watershed, calibrations supported a storage coefficient ratio of 0.5.

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[7] USDA NRCS. Part 630 Hydrology, National Engineering Handbook. Chapter 15, Time of Concentration.

[8] Xu, Jack. SCVWD Technical Memorandum. Time of Concentration (Tc). November 10, 2014.

[9] USACOE HEC-HMS Users Manual v3.5. August 2010. Chapter 7, pg.141.

2.4. REACH ROUTING PARAMETERS

All reach routing was performed from sub-basin to sub-basin using the Muskingum-Cunge method in the hydrologic model, except for Searsville Reservoir. Muskingum-Cunge is an extension of the Muskingum method, which overcomes difficulty in estimating parameters that are not physically based. According to the HEC-HMS technical reference manual[10], Table 19 lists the Muskingum-Cunge routing method as having the most flexibility. In addition, this routing method has been used successfully in previous studies, similar to CUH as mentioned in Section 2.2.

Slopes were taken using elevations at 10% and 85% of the reach length. Manning's roughness coefficients and channel geometry were estimated using aerial images and field visits. For creek reaches downstream of the Los Trancos Creek confluence, a HEC-RAS existing conditions model is available[11]. Channel geometries and slopes were taken from this model and input into the hydrologic model. These geometric parameters did not change during calibration and are summarized in Table 1.

The following assumptions were made to fit the scope of this report in determining design flows:

- All stream channels contain all the flows. There are no breakouts or spills.
- There are no flows entering or leaving the watershed boundaries from spills.

---

[10] USACOE HEC-HMS Technical Reference Manual. March 2000.

[11] Noble Consultants. Final Report – San Francisquito Creek Hydraulic Modeling and Floodplain Mapping, Existing Condition. Volume I: Channel Hydraulic Modeling. August 2, 2010. Prepared for USACE SF District.

Table 1: Reach Routing Parameters

Reach ID	Length (ft)	Channel n-value	Slope (ft/ft)	Slope/n Determination
SFQ_A1_ChnRT	9596	0.05	0.002111	GIS & Field Visit
SFQ_AA14_Z_ChnRT	5293	0.05	0.003862	GIS & Field Visit
SFQ_E_z_ChnRT	18751	0.043	0.00544	RAS
SFQ_G1_ChnRT	7200	0.05	0.021	GIS & Field Visit
SFQ_G2_Z_ChnRT	11000	0.05	0.0137	GIS & Field Visit
SFQ_G5_Z_ChnRT	2049	0.05	0.007112	GIS & Field Visit
SFQ_G6_Z_ChnRT	6264	0.043	0.00694	RAS
SFQ_H_Z_ChnRT	7062	0.043	0.00565	RAS
SFQ_J2_Z_ChnRT	4971	0.043	0.00322	RAS
SFQ_L_Z_ChnRT	10142	0.043	0.00252	RAS
SFQ_M_Z_ChnRT	9361	0.043	0.00201	RAS
SFQ_N_Z_ChnRT	7761	0.03	0.00045	RAS
SFQ_B1_ChnRT	17495	0.05	0.005323	GIS & Field Visit
SFQ_D_ChnRT	6588	0.06	0.002921	GIS & Field Visit
Reaches only in "No Searsville Lake" Model				
SFQ_BB11_ChnRT	7172	0.05	0.003923	GIS & Field Visit
SFQ_BB13_ChnRT	6616	0.05	0.006561	GIS & Field Visit
SFQ_C6_ChnRT	6197	0.05	0.003009	GIS & Field Visit

2.5. DETENTION FACILITIES

In the San Francisquito Creek watershed, there are three notable detention facilities; Felt Lake, Lake Lagunita, and Searsville Lake.

Felt Lake is used as a water supply source for Stanford University, and generally does not impact the overall flow of the watershed. This is also true for Lake Lagunita, which detains runoff from the campus golf course. Conversations with Stanford facilities revealed that Felt Lake and Lake Lagunita have never overtopped, even during the storm of record in 1998. In addition, a sensitivity study performed by peer review showed very little impact. Therefore, both lakes and the contributing runoff area were taken out of the model.

Searsville Dam is a 68-foot-high concrete gravity dam that is comprised of large concrete blocks. It was built in 1892 by the for-profit Spring Valley Water Company, and was acquired by Stanford University in 1919. Stanford University has not used the reservoir for water supply since 2013[12]. Searsville Lake impounds almost 15 square miles of the watershed behind it.

Due to ongoing sedimentation, at rates that are estimated to vary between 3.6 acre-feet to 23.5 acre-feet per year over the lifespan of the dam[13], the lake only has about four feet of storage before spilling, if empty. This amounts to less than 10% of the original water capacity, which is approximately 90 acre-feet. However, the backwater effect caused by the dam, the wetland behind it, and surrounding low-lying areas, has caused significant attenuation in the past. Observations from historical events suggest that typical volume/discharge methods would not be sufficient. To route the flow from the upland tributaries, through the lake, and out the dam, a 2D hydraulic model was used.

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[12] Stanford University Website. http://news.stanford.edu/searsville/. Updated 5/5/2015. Accessed 10/5/2015.

[13] Northwest Hydraulic Consultants, Balance Hydrologics, HT Harvey Associates, Jones & Stokes, Matt Kondolf, Jerry Smith. Searsville Lake Sediment Impact Study. March 2002. Stanford University, Facilities Operations

2.6. SEARSVILLE LAKE 2-D HYDRAULIC MODEL

HEC-RAS Version 5.0 BETA, October 2014 release, was used to properly model Searsville Lake. A 2D computation mesh was created by using a *.LAS dataset from the 2006 LiDAR survey that generated a digital terrain model with 10’ x 10’ squares. This dataset was cleaned to remove errant reflectivity data from foliage and buildings by the survey vendor. Relevant hydraulic structures were inputted with data from Balance Hydrology’s 1D HEC-RAS model[14] of Searsville that was sent to the District for review in 2014. The outfall of the entire model was modeled as a 2D Boundary Condition Line, whose conditions were determined using a rating curve generated from Balance Hydrology’s model. This curve was double checked with recorded stage and flow data from historical events, which was also provided by Balance.

The 2D Boundary Condition Line spans six grid elements, and during simulation, five of those grid elements are wetted. Due to program limitations in the beta, water surface elevations can only be determined on a grid-by-grid basis while in the 2D domain. Conversation with Gary Brunner, lead developer at HEC, revealed that the computational scheme allows for different water surface elevations within each grid at the boundary condition line. Each grid independently uses the rating curve based on its connection at the boundary condition line. Therefore, there are slight variations in the water surface elevations, depending on grid characteristics. To force a singular output for the water surface, the 2D domain would need to be connected to a 1D cross section within the reservoir. Since bathymetry is not available, the five wetted grids will be averaged to determine a single water surface elevation, which will be used to determine flow from the rating curve.

Late in the peer review process, inaccuracies in the terrain data were discovered regarding the resolution of Corte Madera Creek and the Stanford Causeway gap. The former was addressed by using recently surveyed cross sections present in an existing Balance Hydrologics HEC-RAS model. The cross sections were used to adjust the terrain to reflect surveyed conditions. For the Stanford Causeway, the bridge piers in the crossing were added to the terrain. The bridge deck was not modeled since the 100-yr WSEL does not reach the low chord. A sensitivity analysis was performed between the two sets of terrain using both the 24-hr and 72-hr 100-yr design storms. The outcome was a 0.05’ difference in WSEL at the dam and a resulting flow change of under 5%. Therefore revised terrain was only used in determining the 10-yr and 100-yr design storms, while the original terrain was still used for calibration and sensitivity studies.

Computational point spacing for the mesh was set at 100’ x 100’ and 50’ x 50’, depending on the detail required. A sensitivity analysis that ran the same model at a 10’ x 10’ mesh showed negligible output difference. The diffusive wave computational method was selected over the full dynamic solution due to the lack of potential energy losses through obstructions. A sensitivity analysis using different methods also yielded negligible difference.

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[14] Sears_US_JPA_052114.prj. Balance Hydrology is Stanford University’s consultant.

To properly characterize the lake, several historical calibrations needed to be run to determine if the model is accurate. When available, stream gage data was used as input into the model. HEC-RAS inputs from other tributaries that were not gaged were estimated. Using the following storm events, a final manning's roughness coefficient of 0.1 worked well for all the storms.

- December 2012 (Figure 2)
- March 2011 (Figure 3)
- January 2010 (Figure 4)
- December 2005 (Figure 5)
- February 1998 (Figure 6)

To estimate the HEC-RAS inflow inputs from the Searsville Lake tributaries, several methods were employed. For the 2011 and 2010 events, only one tributary (Corte Madera Creek) was gaged. For 1998, there were no gages upstream of the dam. These events also had reliable gage adjusted radar rainfall data, and were used in the historical calibrations for the hydrologic model. Therefore, outputs from the HEC-HMS hydrology model were used as tributary inflow inputs for the HEC-RAS models. Parameters used in the HMS model were the same as in the model calibrations for the specific event.

For the 2005 event, only Corte Madera Gage was gaged. However, rainfall data was not reliable. Therefore, the remainders of the tributary inflows were determined by scaling the Corte Madera Creek hydrograph based on drainage area.

The 2012 event had two gaged tributaries. Additionally, a third tributary had visual observations for estimated flow. For the remaining tributaries, flow was determined by scaling the hydrographs from the average of the two gaged tributaries, much like in the 2005 event. However, for the tributary with visual observations, the hydrograph was modified so that the observed flow values properly fit within the rising and receding values of the hydrograph.

Using the calibrated 2D hydraulic model and recorded data, a separate technical memorandum[15] was published. This report attempted to quantify the causes of attenuation for Searsville Lake and the effects of the Lake on San Francisquito Creek during significant storm events. This memorandum is included in this report in Appendix A.

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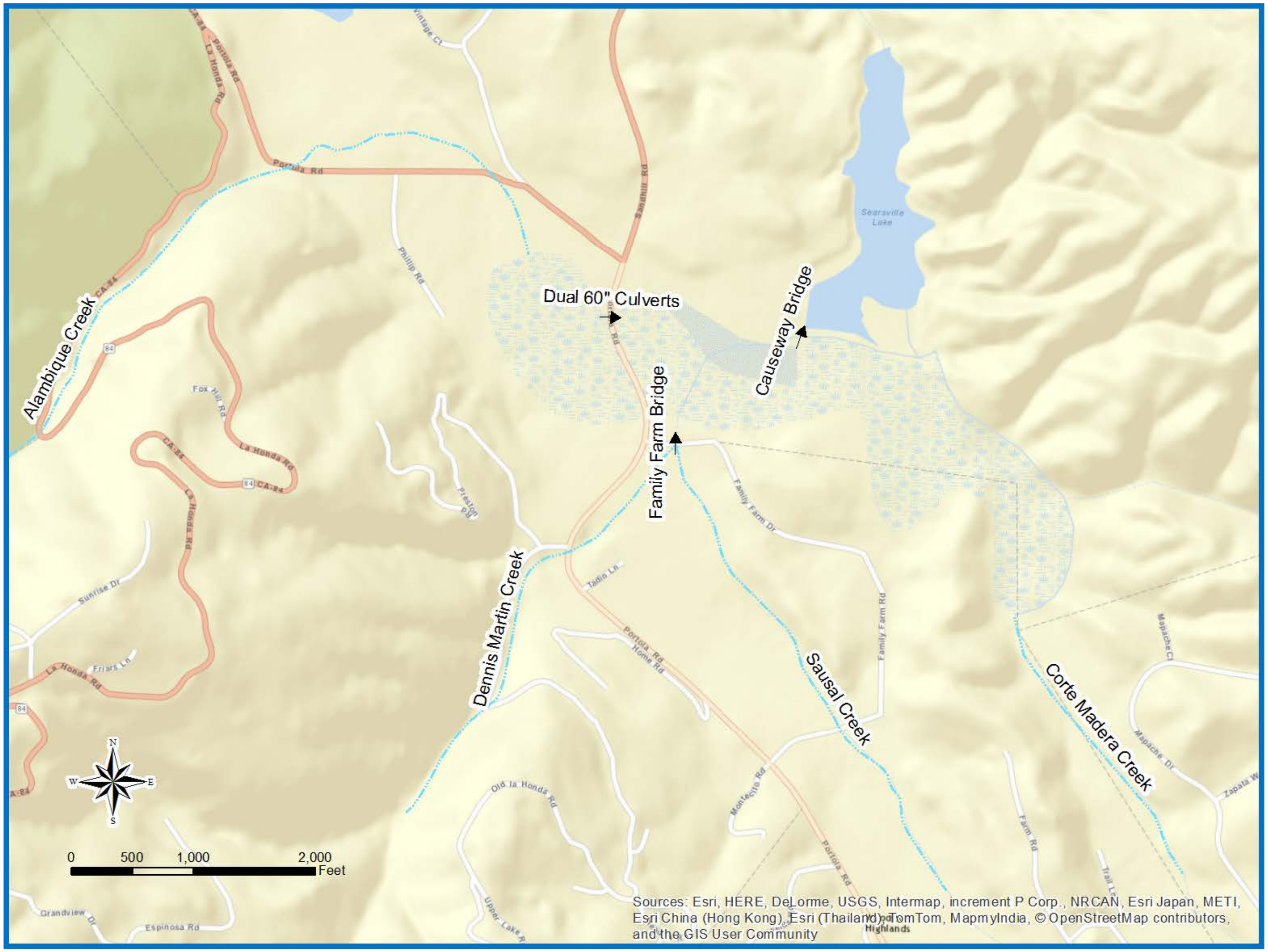
[15] Xu, Jack. SCVWD. Technical Memorandum - Effect of Searsville Lake on Large Storm Events. March 25, 2015.



Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Figure 2: Searsville Lake Detail Map

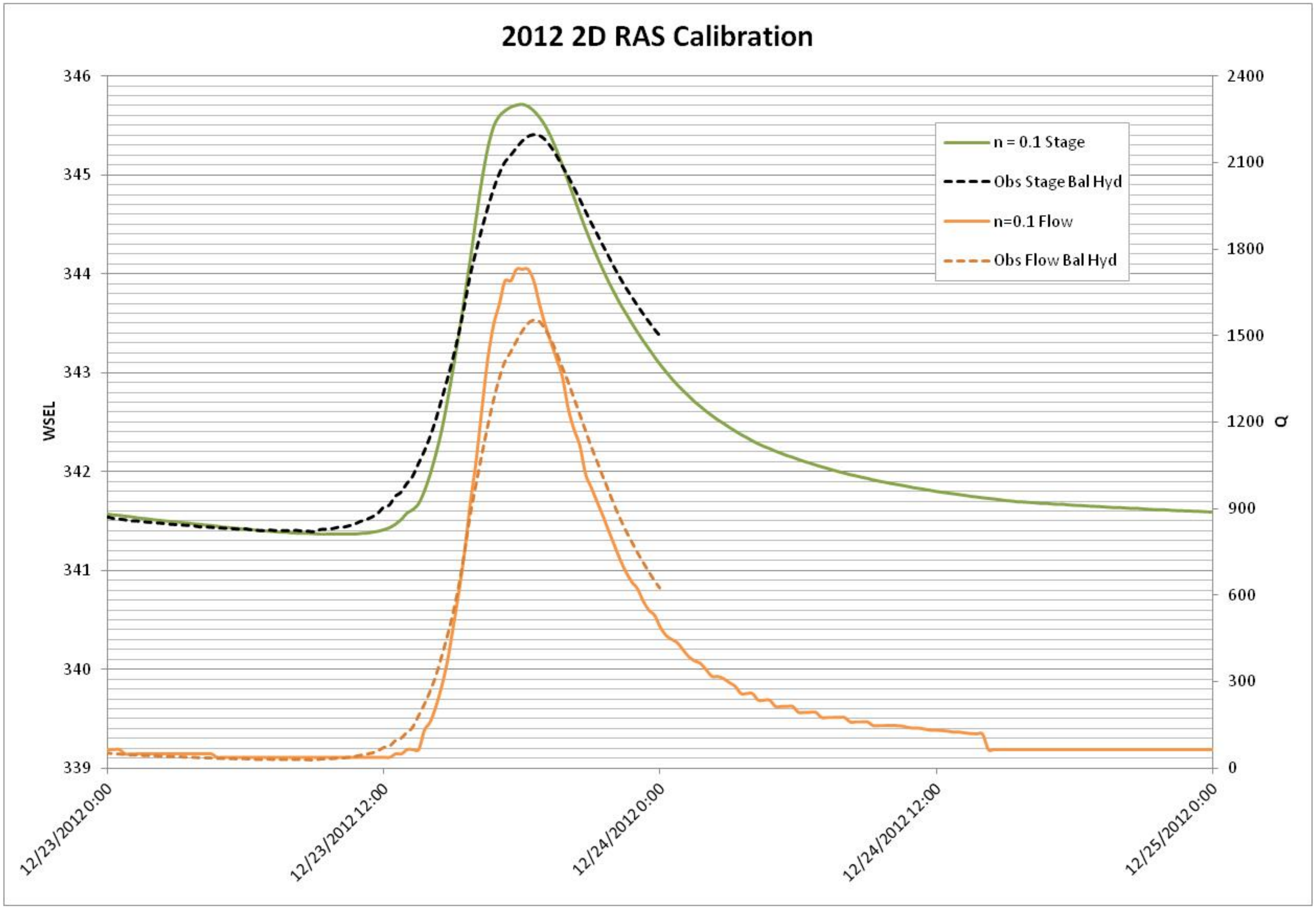


Figure 3: 2012 Searsville 2D Model Calibration

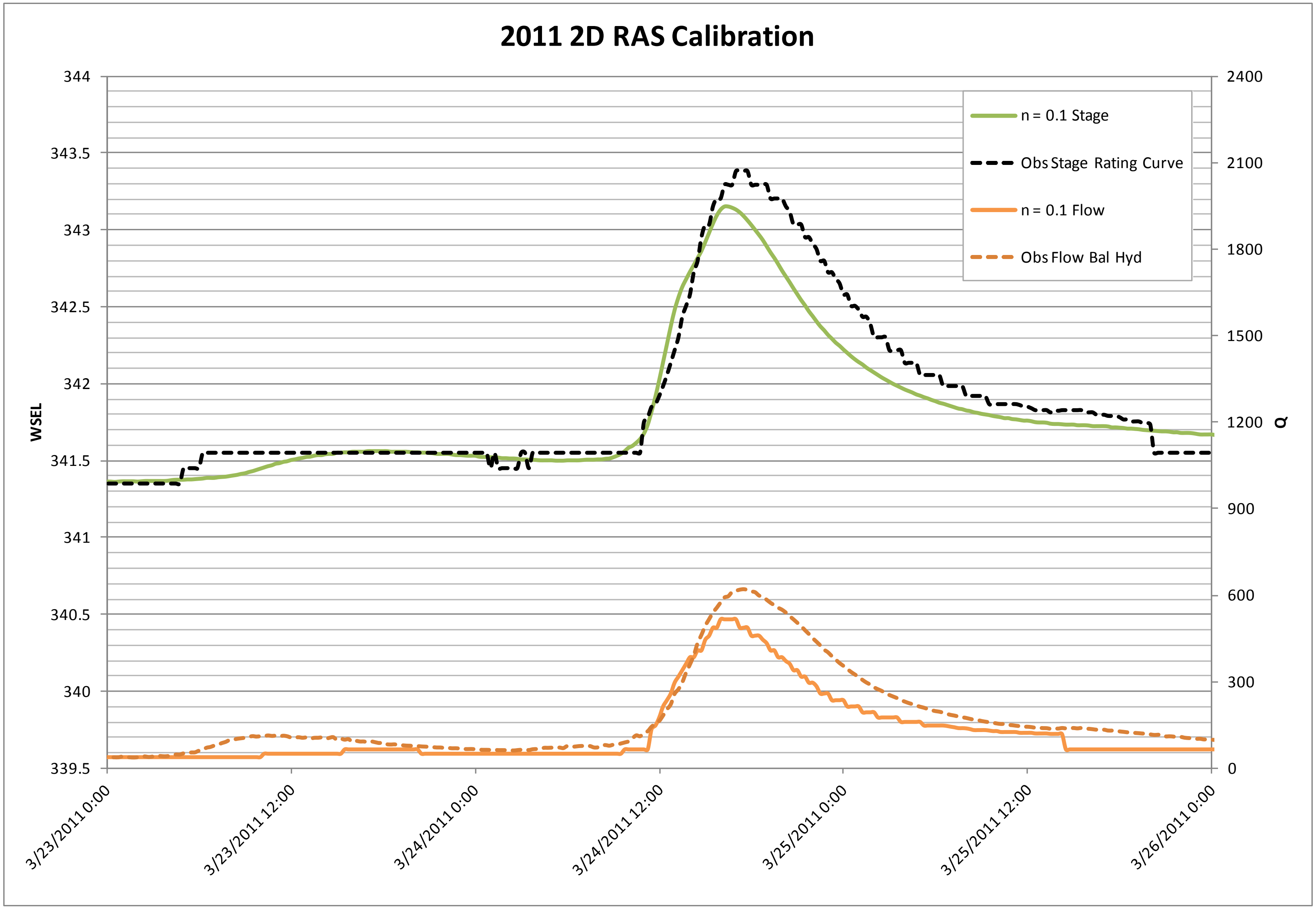


Figure 4: 2011 Searsville 2D Model Calibration

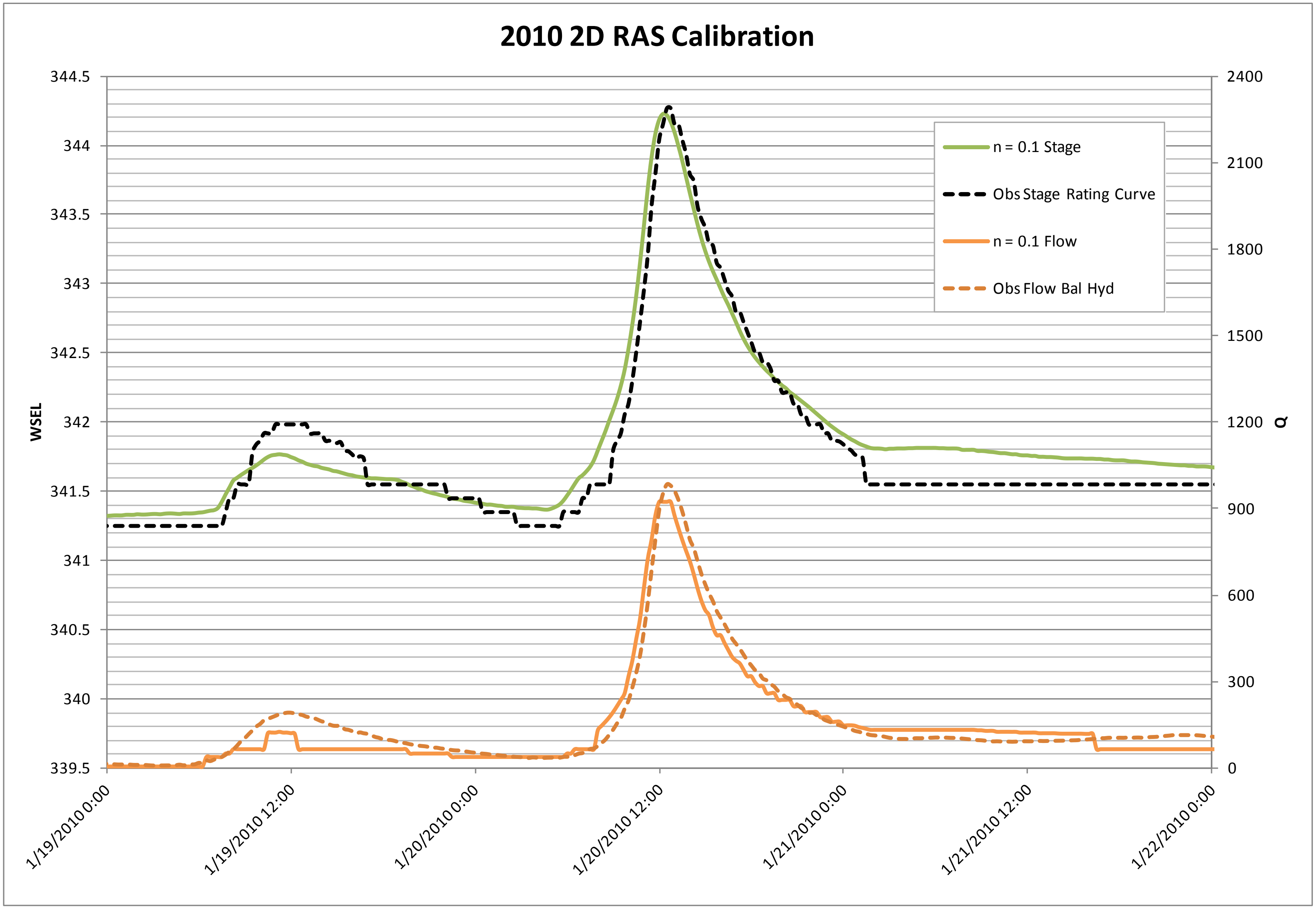


Figure 5: 2010 Searsville 2D Model Calibration

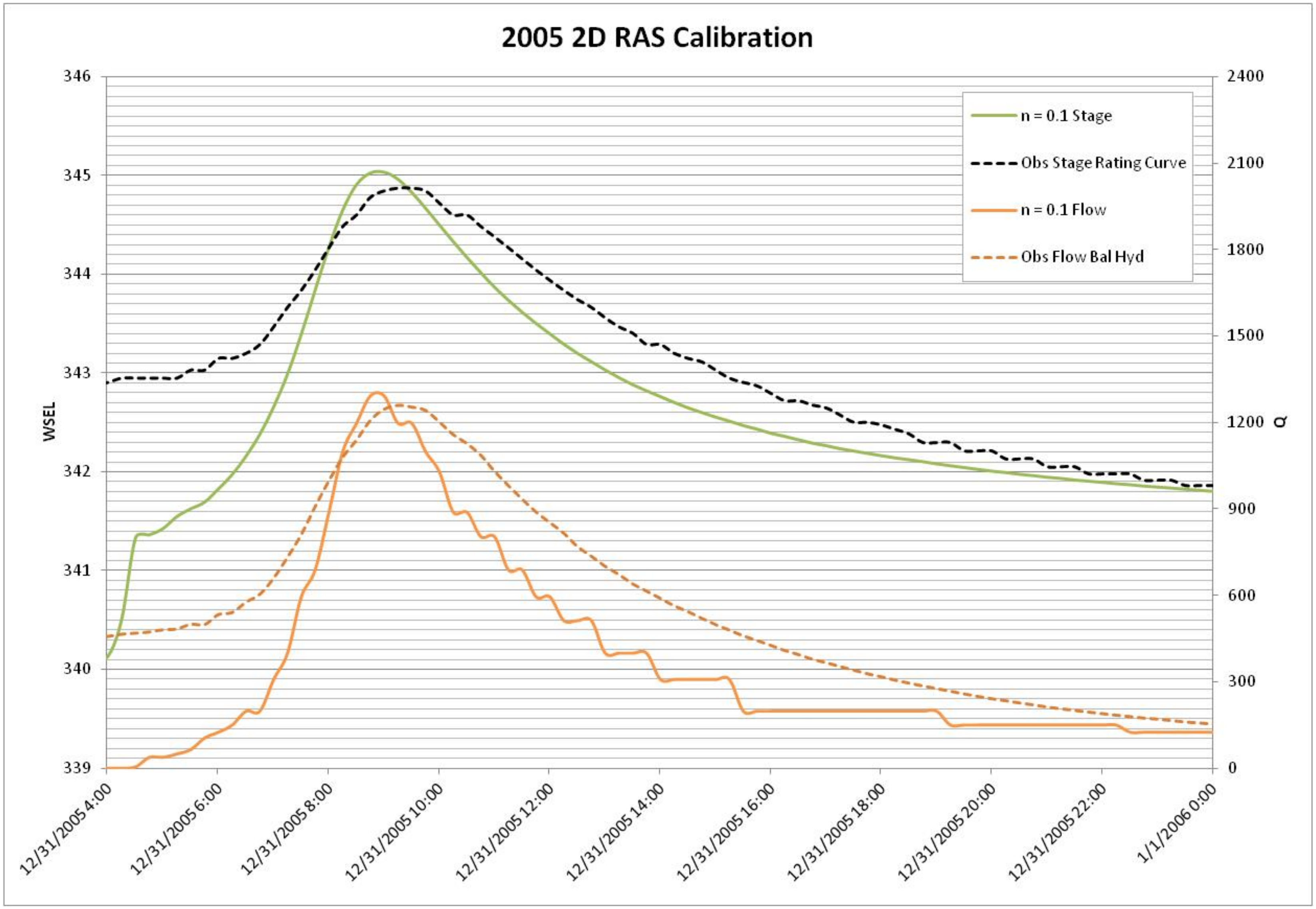


Figure 6: 2005 Searsville 2D Model Calibration

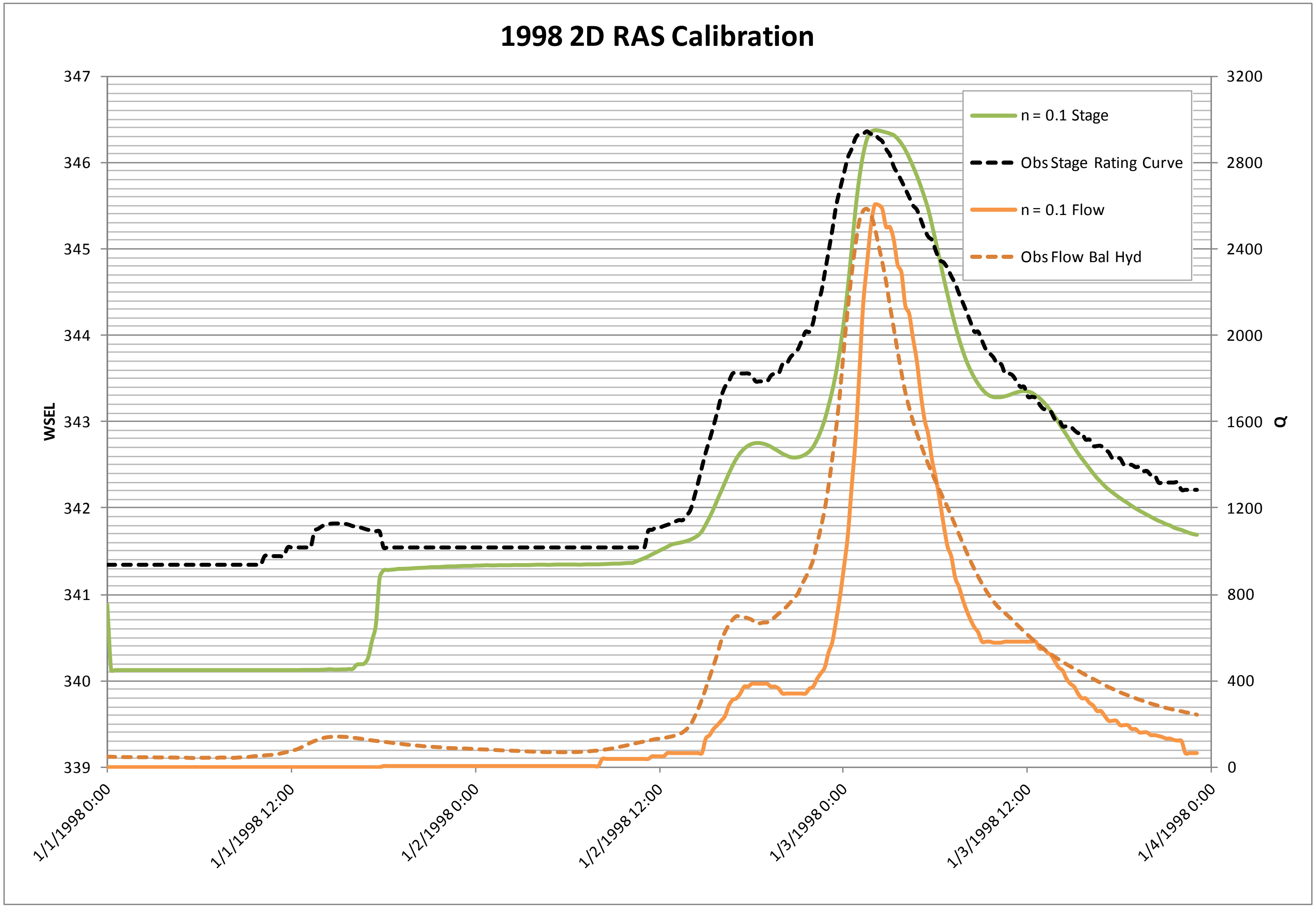


Figure 7: 1998 Searsville 2D Model Calibration

3. MODEL CALIBRATION AND VERIFICATION

3.1. STREAM GAGES

Several stream gages operated by Balance Hydrology (Stanford) have been installed recently on the upstream tributaries of San Francisquito Creek, but data availability for storm events is spotty. There is also a USGS gage, #11164500, near Stanford that has 74 annual maximum observations over 83 years. This gage will be used to determine the flood frequency analysis (FFA).

3.2. CALIBRATION PROCEDURE

The San Francisquito Creek HEC-HMS hydrology model was calibrated and verified to observed stream gage data by using historical gage adjusted rainfall radar data that has been calibrated to observed rain gage data. In short, observed rainfall data was used as input into the hydrologic model for several historic storm events, and the output values compared to observed stream gage data for the same event.

Calibration and verification was done by using the USGS gage recorded flows as the primary gage, since it is considered the most reliable. Gages operated by Balance upstream of the USGS gage were considered suspect for some events. The observed data from these gages were used when evidence did not prove them suspect. However, the observed data was still used as a general reference for suspect events to determine peak timing. Five sub-areas were categorized based on gage catch points to facilitate discussion of model calibration results. The general flowchart is shown in Figure 7.

- Searsville, which includes the area tributary to Searsville Lake and Dam.
- Bear, which includes all of Bear Creek and tributaries up to its confluence to San Francisquito Creek below the Dam.
- Los Trancos, which includes all of Los Trancos Creek and tributaries up to the stream flow gage.
- USGS, which includes all the drainage area from Searsville, Bear, and Los Trancos, to the USGS stream gage
- Urban, which includes the area between the USGS stream gage and the San Francisco Bay.

A map of the five sub-areas, along with the locations of flow measurement stations can be seen in Figure 12.

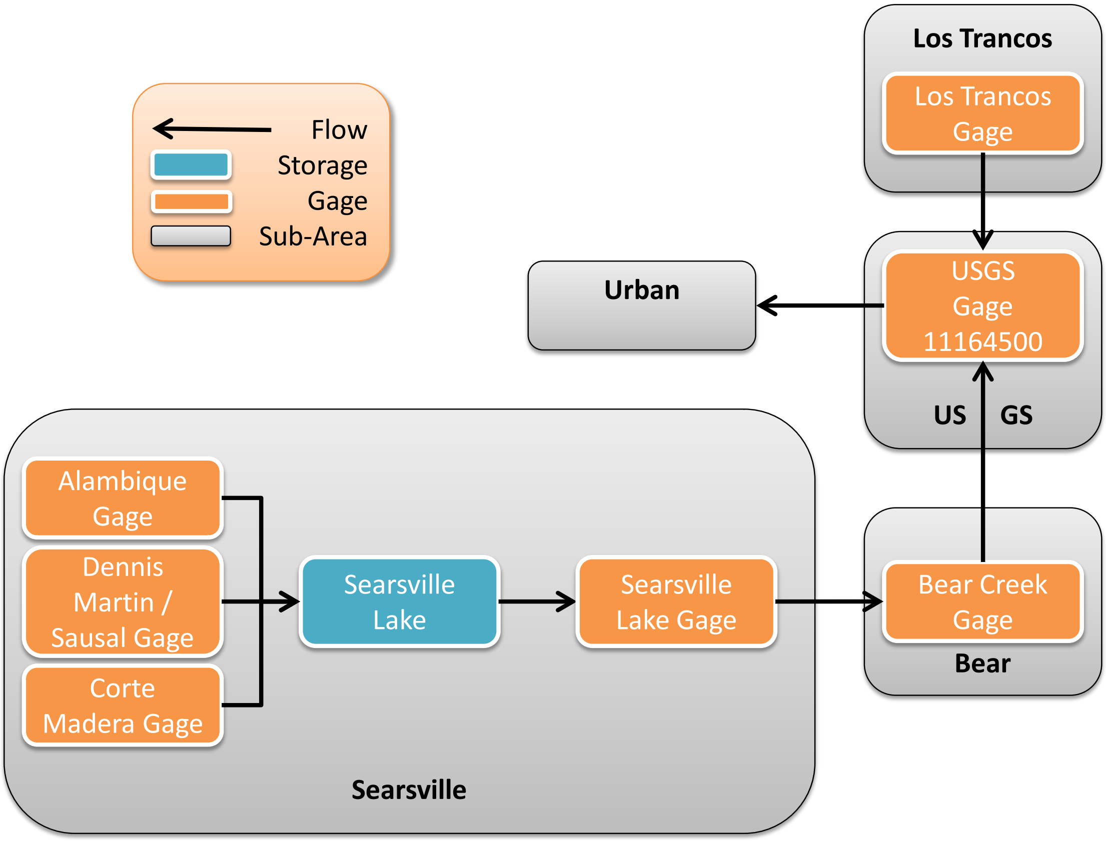


Figure 8: Calibration Sub-Areas

3.3. STREAM GAGE ERRORS

Recorded stream gage data in 2010 and 2011 from Balance are suspiciously low compared to flows measured at the downstream USGS gage. Almost all the runoff is contributed by the majority of the upstream hill watershed, which also gets the most rain. In 2012 and 2006, the total of all the Balance gages was very close to the USGS gage, as shown in Figure 8 and Figure 9. However, in 2011 and 2010, a large amount of flow is missing, shown in Figure 10 and Figure 11. It is likely that there was error in flow measurements from Balance under these circumstances. Therefore, observed Balance stream gate data points for 2011 and 2010 will be used for reference only.

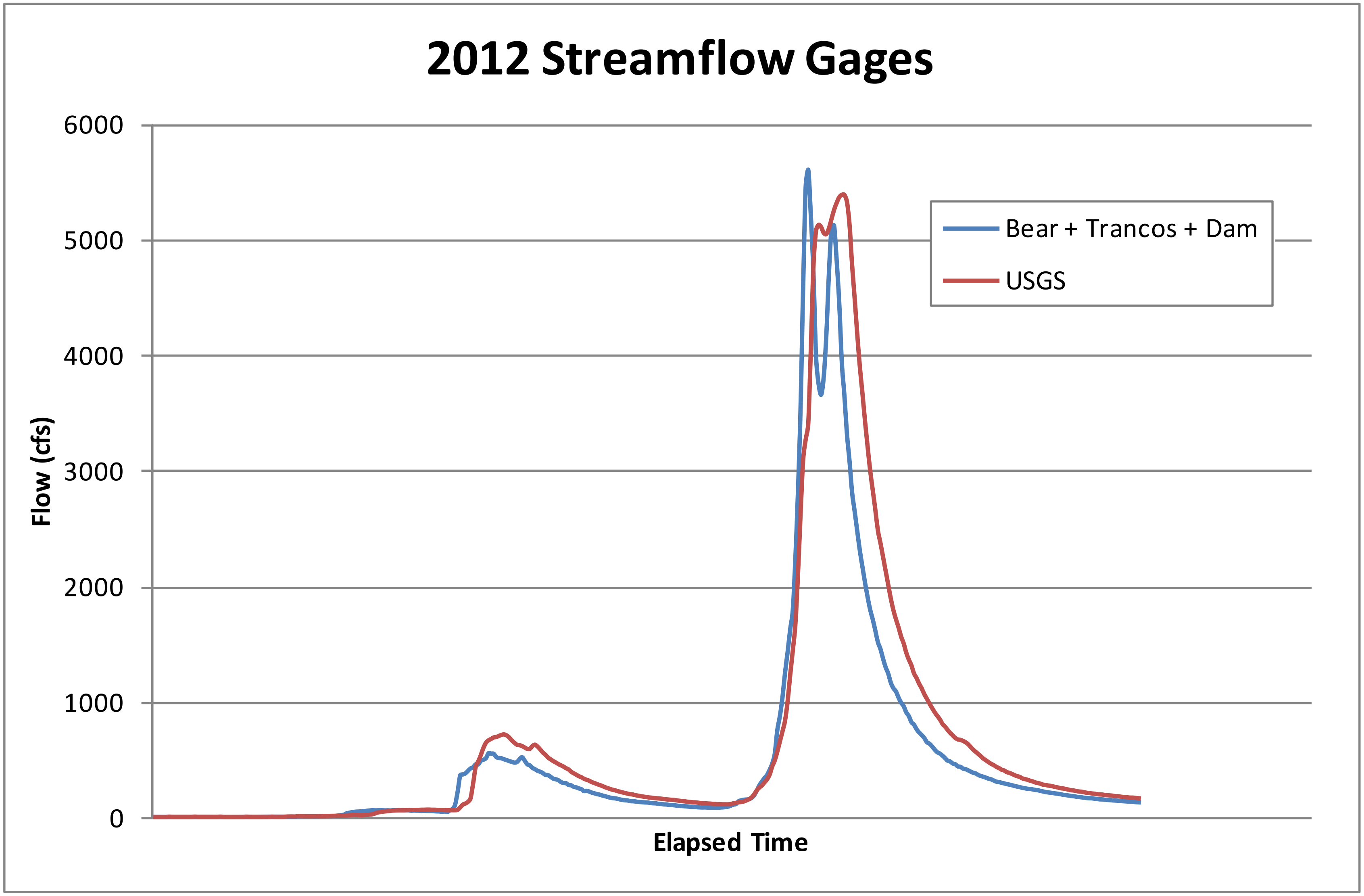


Figure 9: 2012 Streamflow Gage Comparison

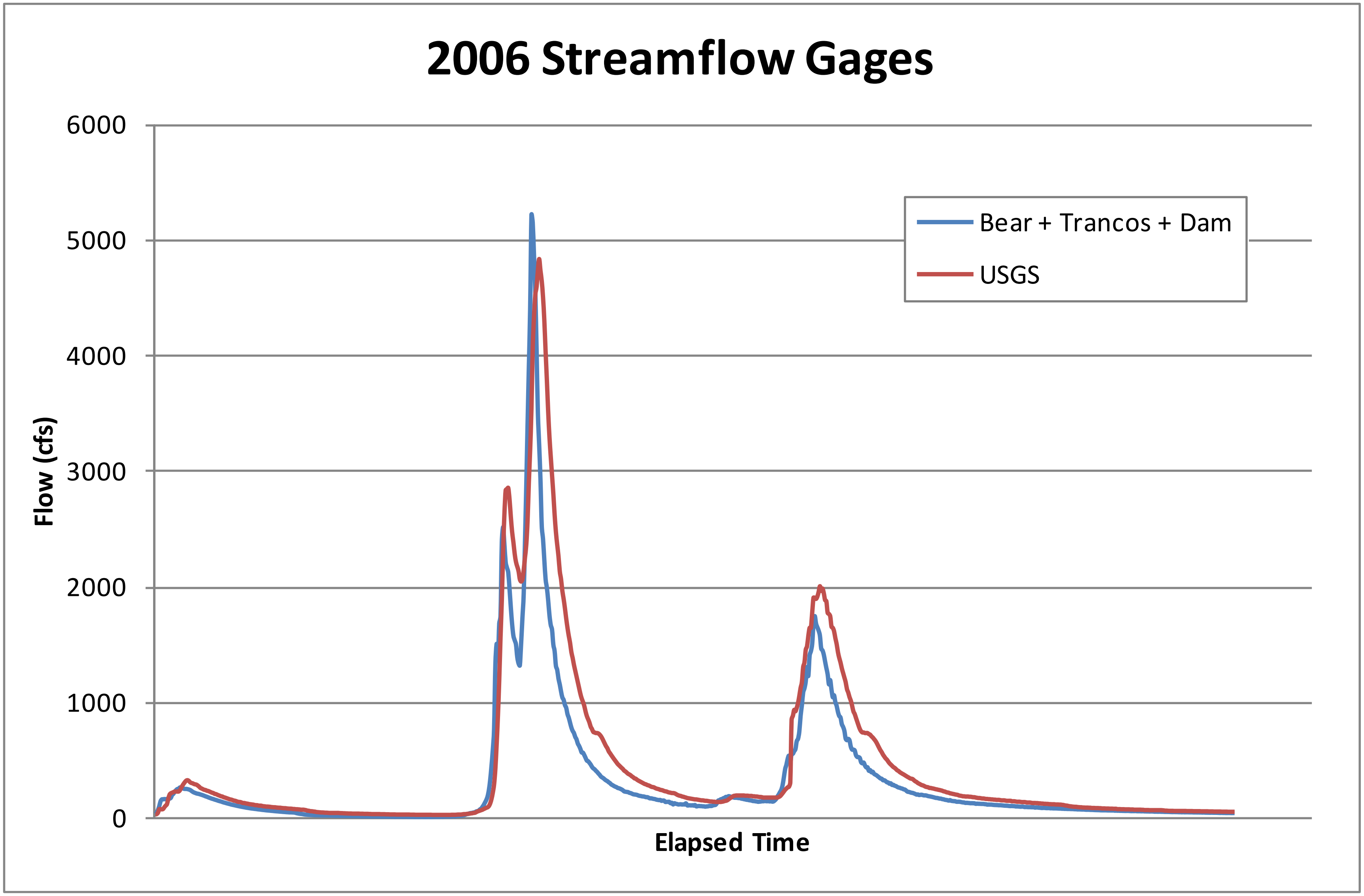


Figure 10: 2006 Streamflow Gage Comparison

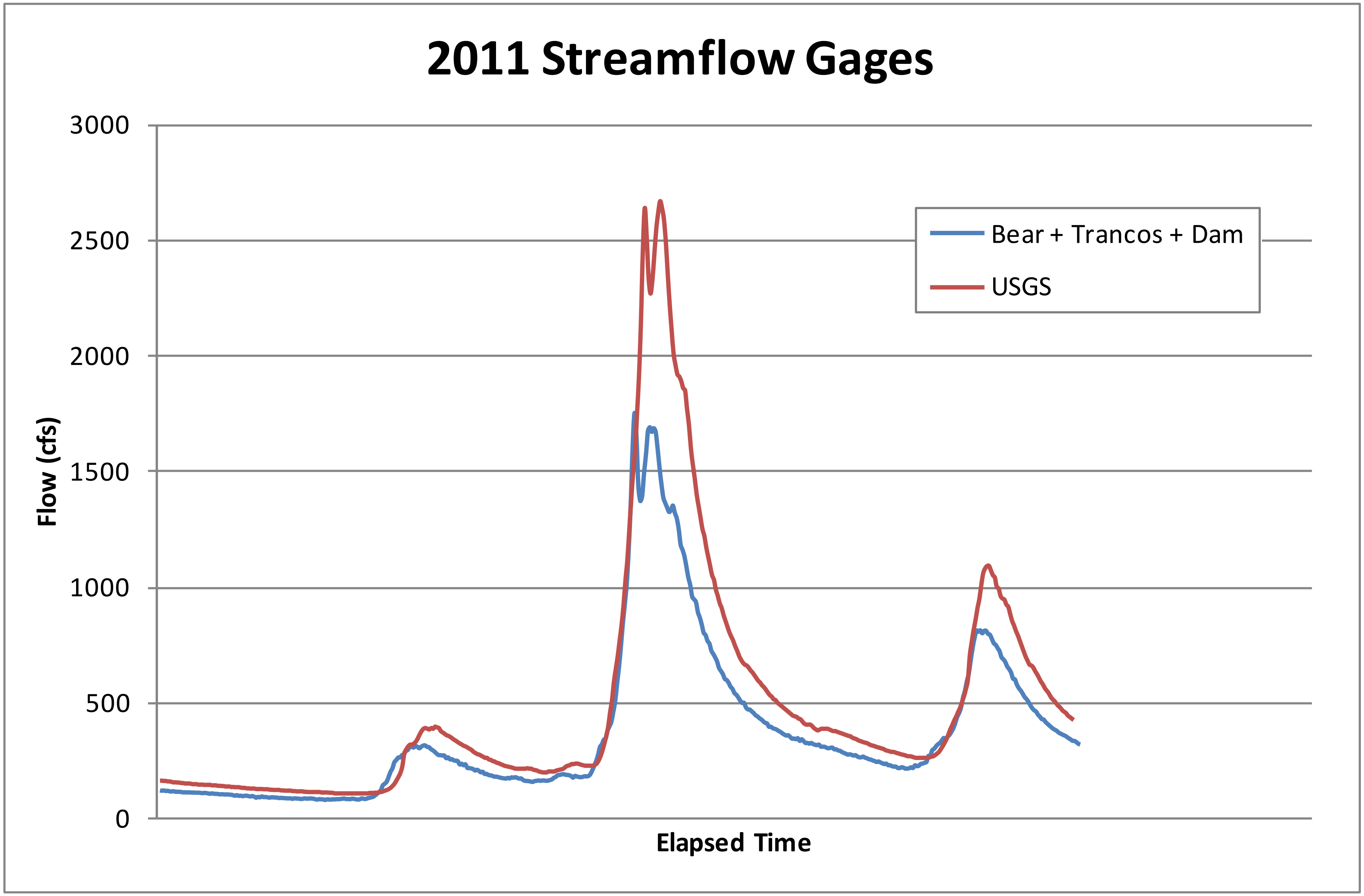


Figure 11: 2011 Streamflow Gage Comparison

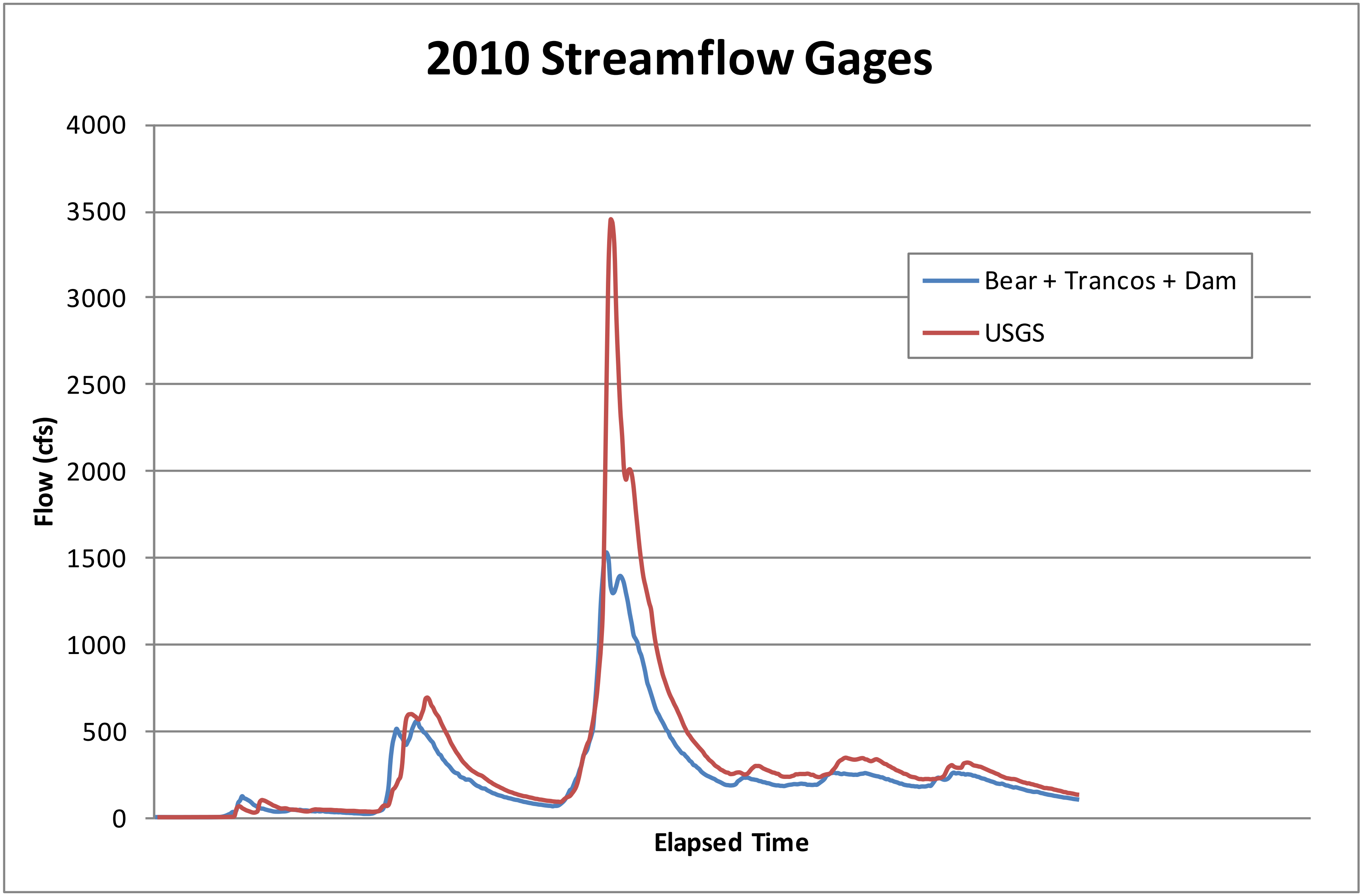


Figure 12: 2010 Streamflow Gage Comparison

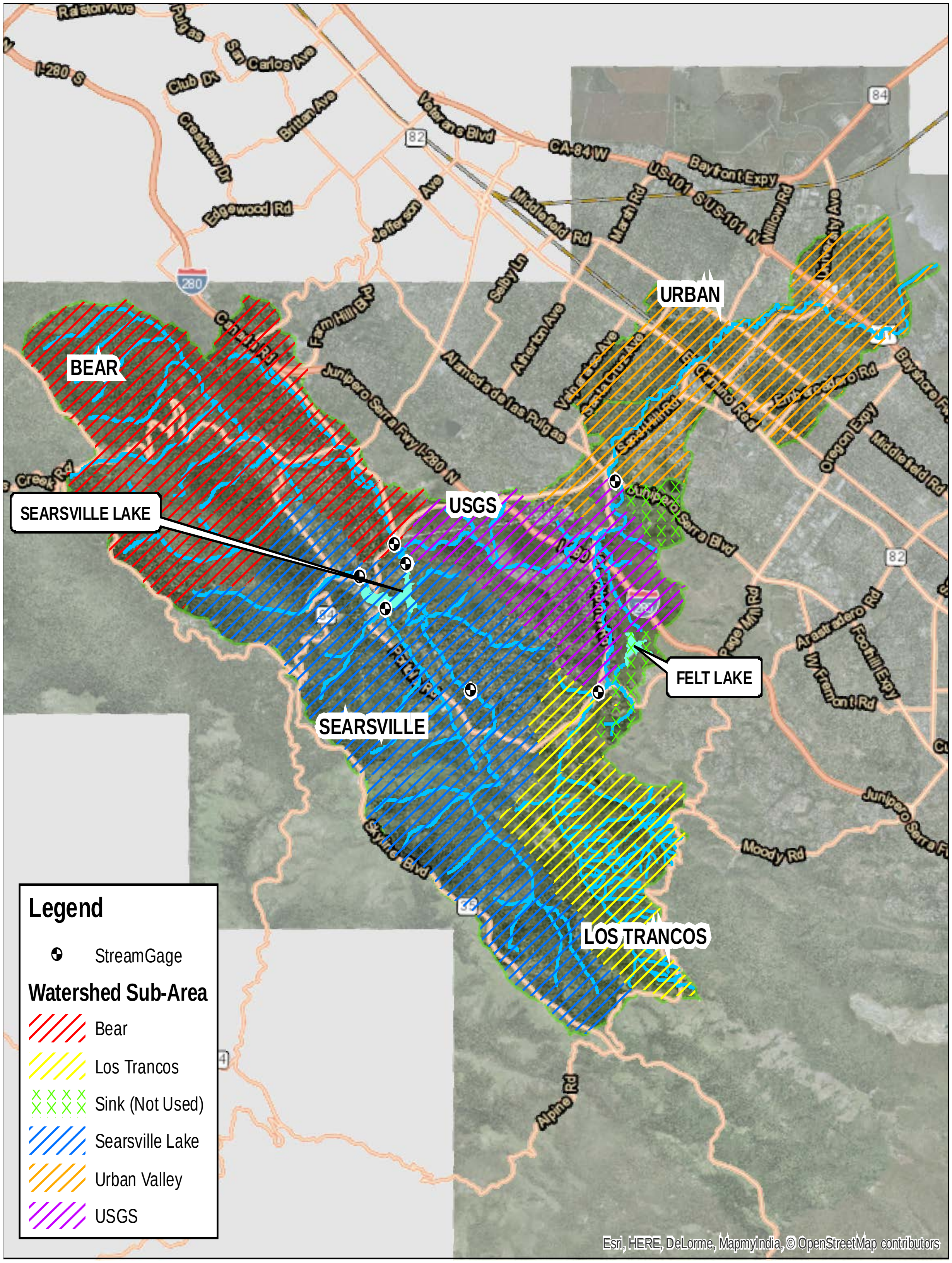


Figure 13: Basin Map

4. CALIBRATION AND VERIFICATION RESULTS

4.1. 02 FEBRUARY 1998

Table 2: February 1998 Model Calibration Parameters

Sub-Area	AMC	Time of Concentration Q*	Storage Coefficient (R) Ratio
Bear	2.25	Q25	0.5
Searsville	1.75	Q10	0.5
Los Trancos	2.0	Q25	0.5
USGS	2.0	Q25	0.5
Urban	2.0	Q25	0.5

**As described in Section 2.3.5 – numbers are based of observed flows at gaging points.*

Three gage locations were in operation for this storm event: USGS, Searsville Lake, and Los Trancos. Since Searsville Lake has already been calibrated, and no gages were in operation upstream of the dam, the observed gage outflow from the dam will be used as input for this calibration event. A 1.75 AMC value for Searsville with a slightly lower time of concentration flow matched well for the 2D model calibration. Flow at the USGS gage matched well.

The peak timing for the Los Trancos gage is slightly later for the modeled result. However, this gage experienced backwater from the downstream fish ladder according to notes by Balance Hydrology. Therefore, this reading serves only as a reference.

The peak timing for the USGS gage is also slightly later for the modeled result and there is slightly less volume in the front end of the hydrograph. However, the calibration results are acceptable. The Bear sub-area antecedent moisture condition (AMC) was increased slightly to 2.25 to bring flows at the USGS gage up to observed values.

Observed flows are in black. Modeled flows are shown in blue. A reference rainfall pattern over Searsville Lake is included under the hydrographs.

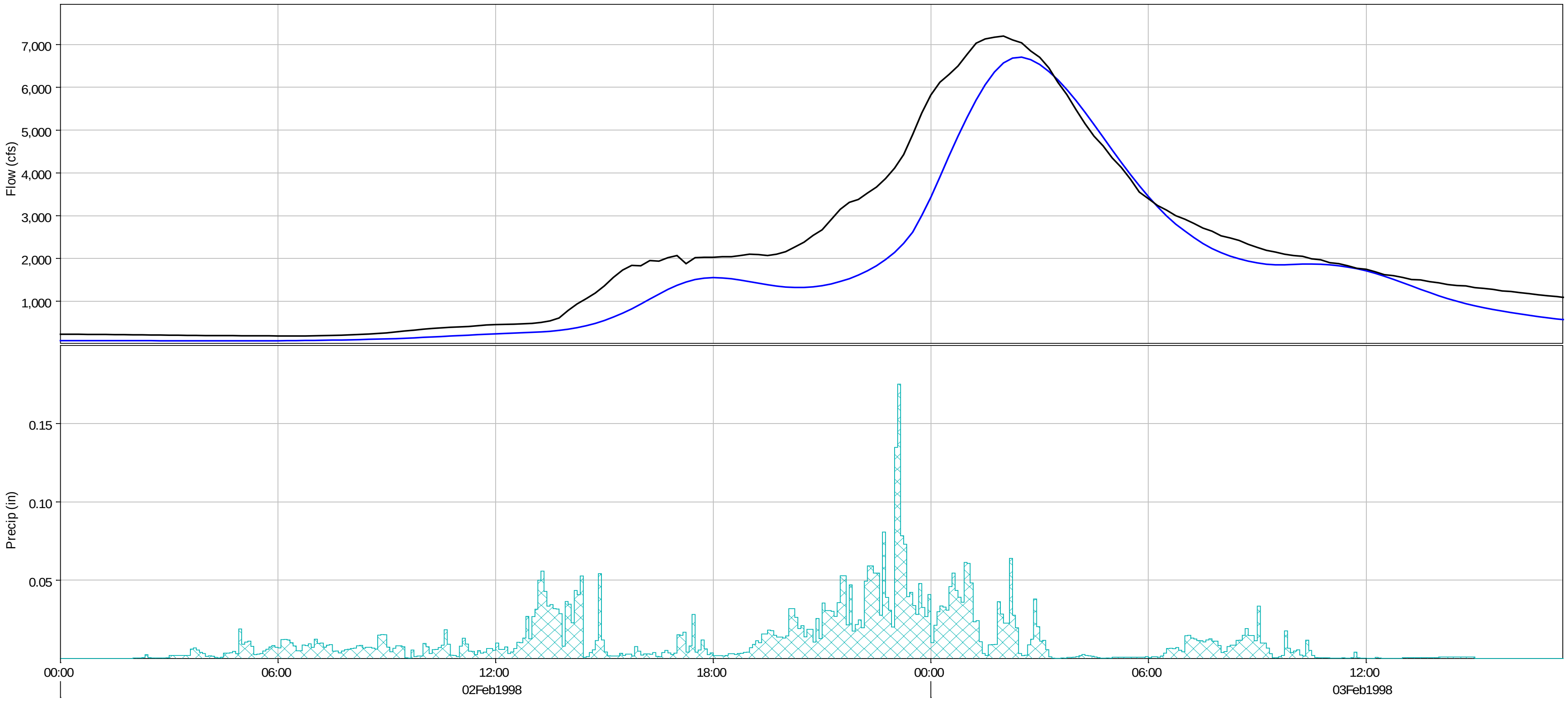
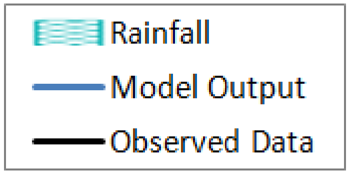


Figure 14: USGS – February 1998



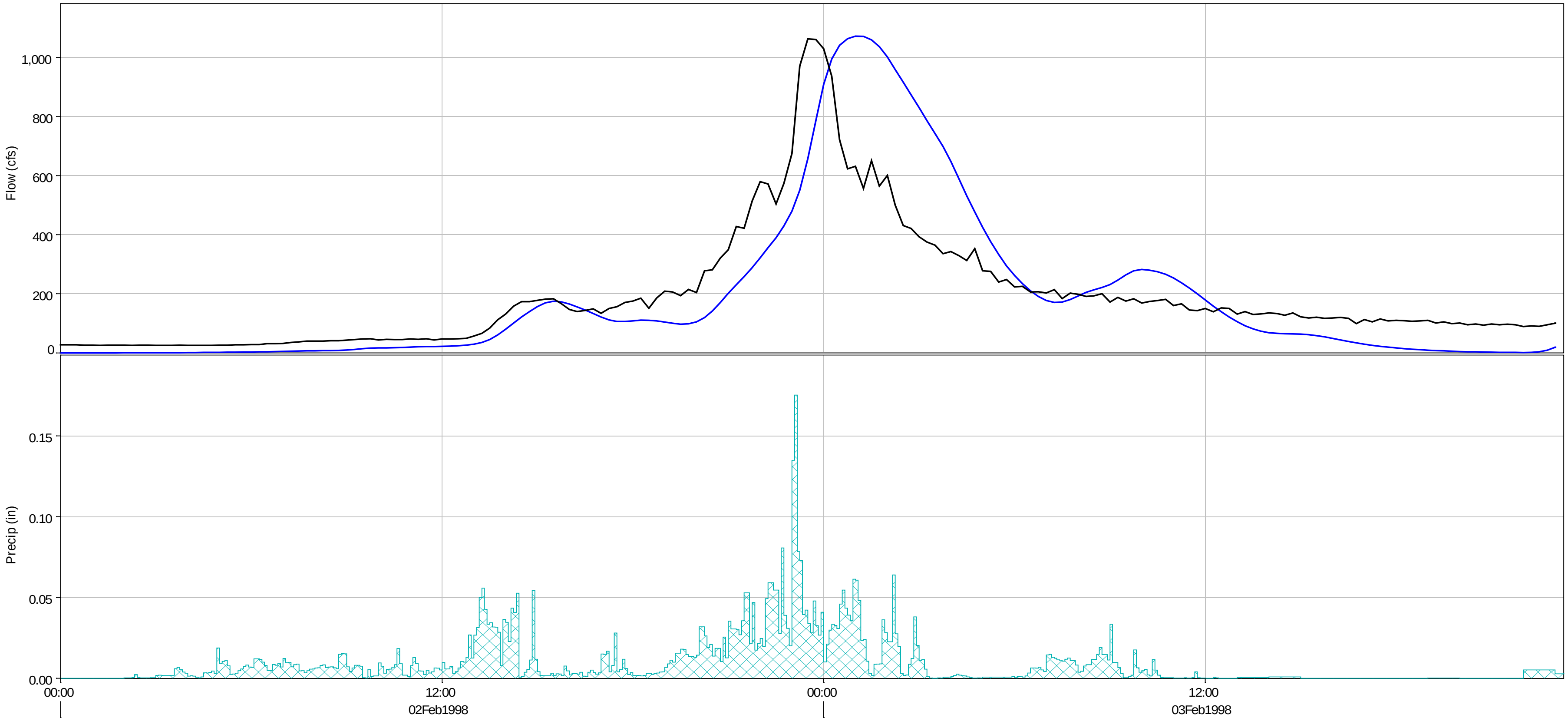


Figure 15: Los Trancos - February 1998

NOTE: *Los Trancos stream flow gage measurements experienced observed backwater from a downstream fish ladder.*

4.2. 12 FEBRUARY 2000

Table 3: February 2000 Model Calibration Parameters

Sub-Area	AMC	Time of Concentration Q	Storage Coefficient (R) Ratio
Bear	2.75	Q10	0.5
Searsville	2.0	Q10	0.5
Los Trancos	1.75	Q5	0.5
USGS	2.0	Q10	0.5
Urban	2.0	Q10	0.5

**As described in Section 2.3.5 – numbers are based of observed flows at gaging points.*

Three gage locations were in operation for this storm event: USGS, Bear, and Los Trancos. Searsville Lake observed outflow was not available for this date so the 2D hydraulic model was used to supplement. The hydrologic model was run with the parameters shown above, and the output hydrographs upstream of Searsville Lake were used as flow inputs into the 2D model. The resulting 2D spill from Searsville Dam was used as input into the hydrologic model to complete the calibration.

The Bear gage required a very high AMC value of 2.75 to reach the flows observed from the gage. It is suspected that poor rainfall data is to blame. Downstream, observed gage data was used as input. Los Trancos Creek experienced little flow comparatively.

The recorded USGS gage hydrograph has more volume and peak flow than the model. Since most of the flow is controlled by the inputs of Bear, Searsville, and Los Trancos, it is suspected that a combination of low rainfall data affecting runoff volume (evidenced by Bear) and observed stream gage data that is slightly off. Overall, the timing and peak still match well.

Observed flows are in black. Modeled flows are shown in blue. A reference rainfall pattern over Searsville Lake is included under the hydrographs.

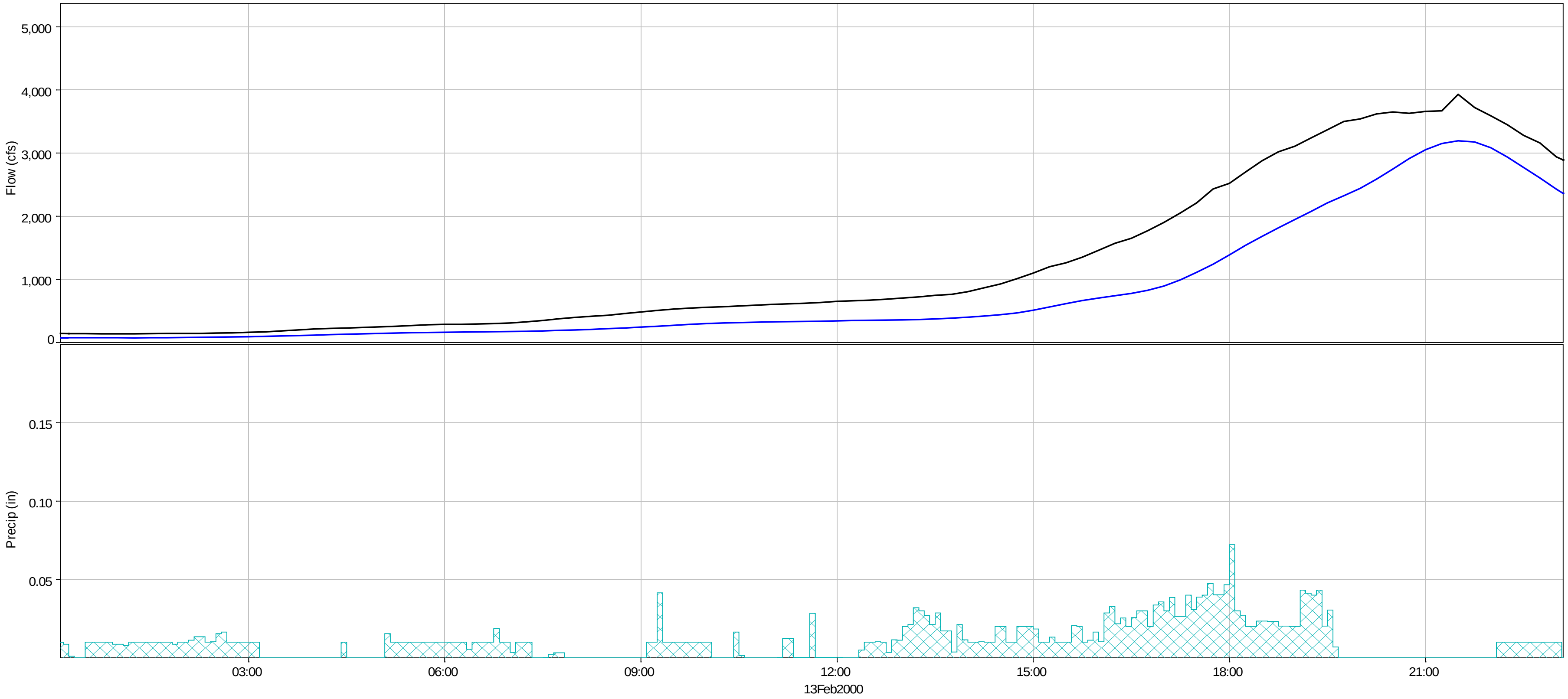
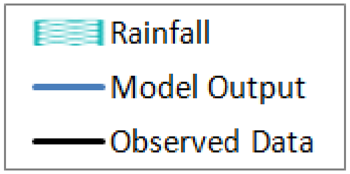


Figure 16: USGS – February 2000

NOTE: *Bear Creek and Los Trancos observed flow data were used as inputs in determining flow at USGS.*



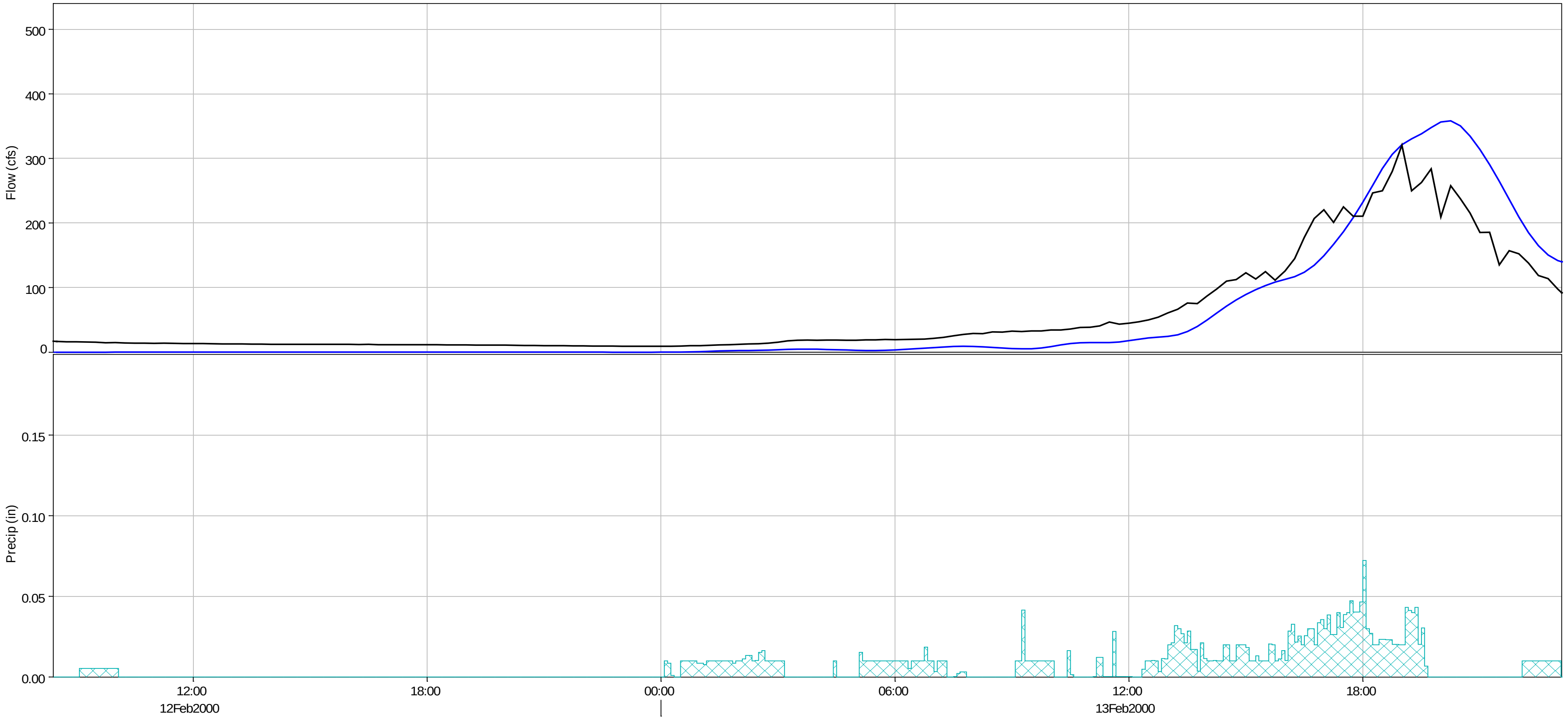
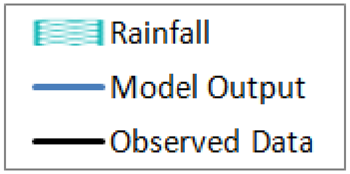


Figure 17: Los Trancos – February 2000



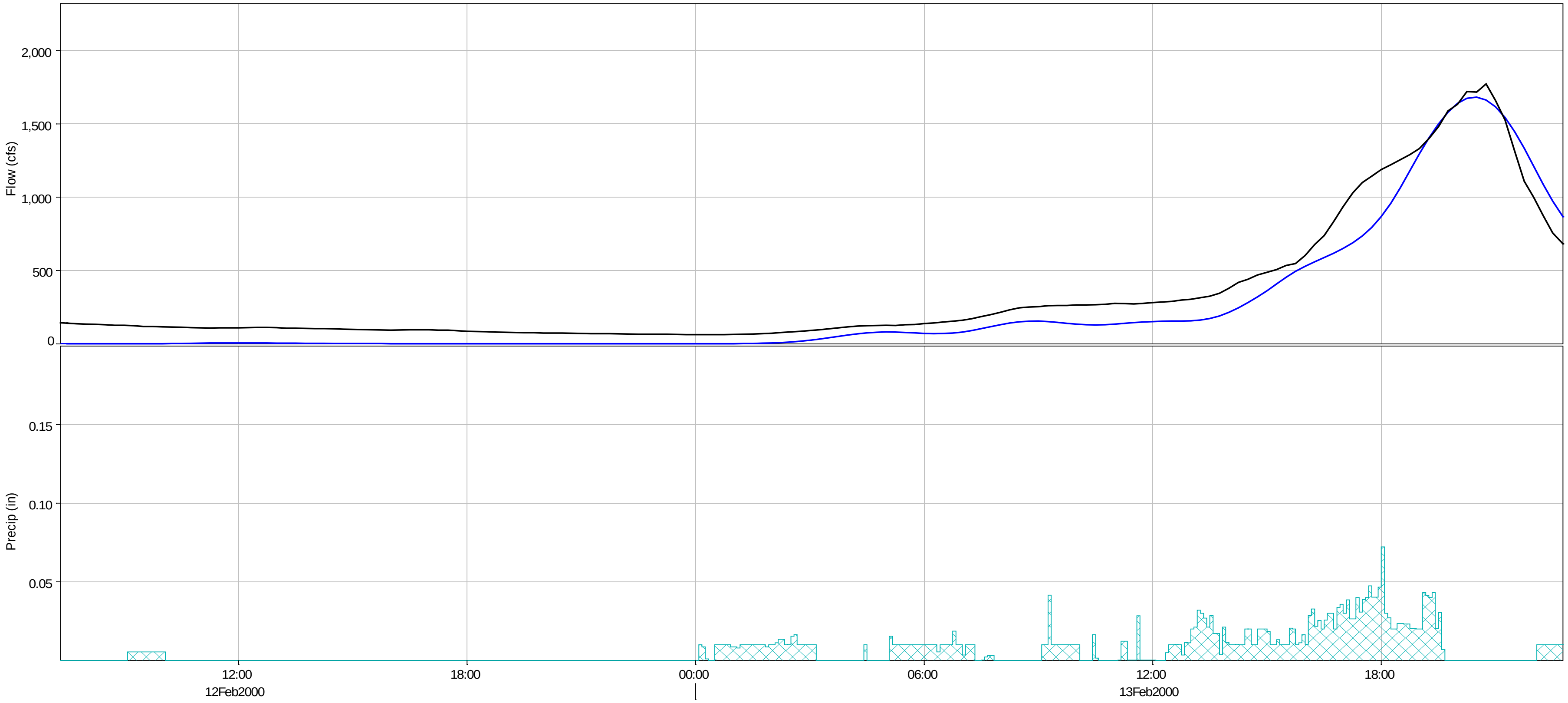


Figure 18: Bear – February 2000

4.3. 18 JANUARY 2010

Table 4: January 2010 Model Calibration Parameters

Sub-Area	AMC	Time of Concentration Q	Storage Coefficient (R) Ratio
Bear	2.0	Q10	0.5
Searsville	1.75	Q10	0.5
Los Trancos	2.0	Q10	0.5
USGS	2.0	Q10	0.5
Urban	2.0	Q10	0.5

**As described in Section 2.3.5 – numbers are based of observed flows at gaging points.*

Five gage locations were in operation for this storm event: USGS, Searsville Dam, Bear, Corte Madera, and Los Trancos. From previous discussion about possible gage errors stemming from Bear and Los Trancos, the observed flow from these gages were not used as inputs. Downstream reference points relied solely on the model.

Using the Searsville recorded outflow, combined with Bear and Los Trancos watersheds at an AMC of 2.0, the modeled flow at the USGS gage matched well with the observed data.
For the Searsville watershed, the only operational gage upstream was Corte Madera. The catch point in the model is downstream of the gage, and therefore a higher modeled flow would be expected. An AMC value of 1.75 computed a flow that is slightly larger than recorded.

Observed flows are in black. Modeled flows are shown in blue. A reference rainfall pattern over Searsville Lake is included under the hydrographs.

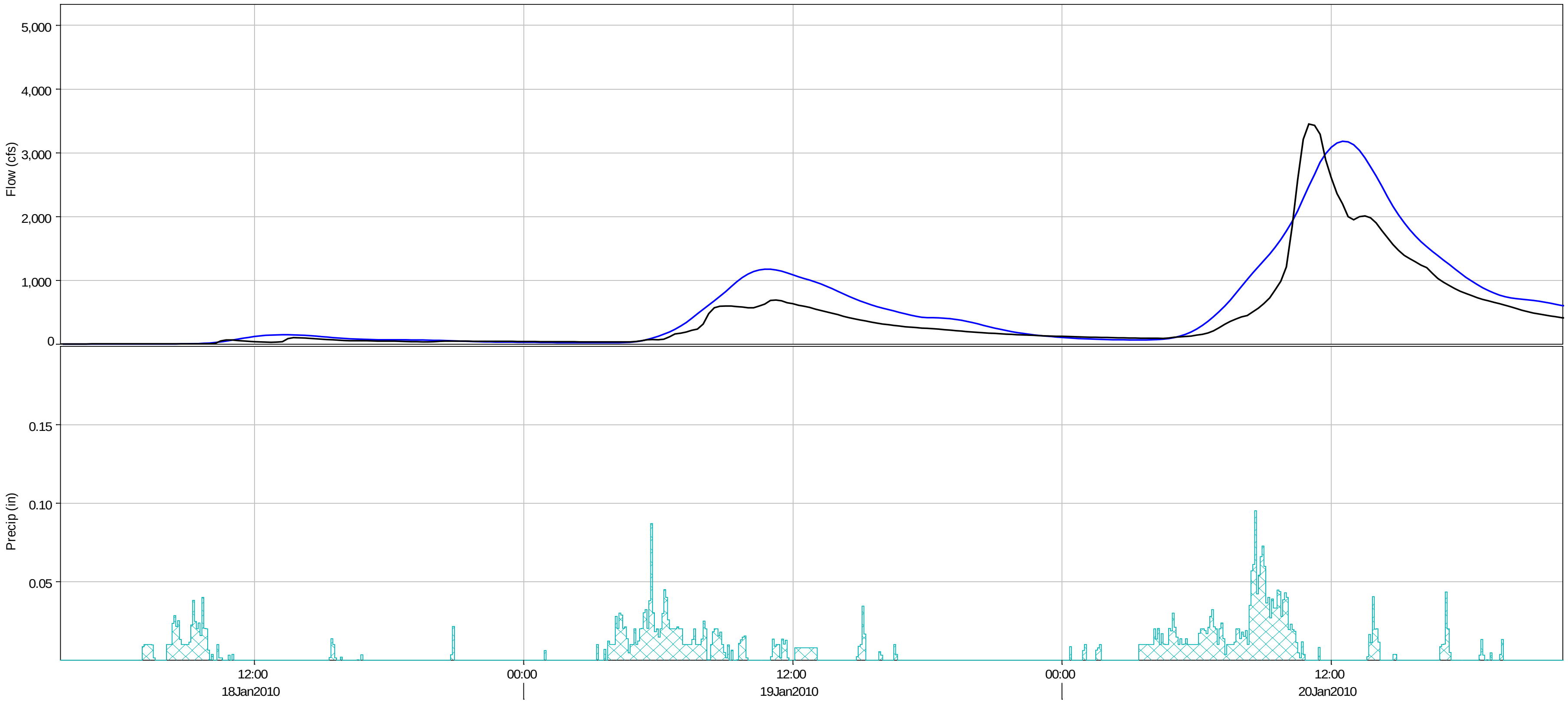


Figure 19: USGS – January 2010

NOTE: *Bear Creek and Los Trancos observed flow data were removed and not used as inputs in determining flow at USGS.*

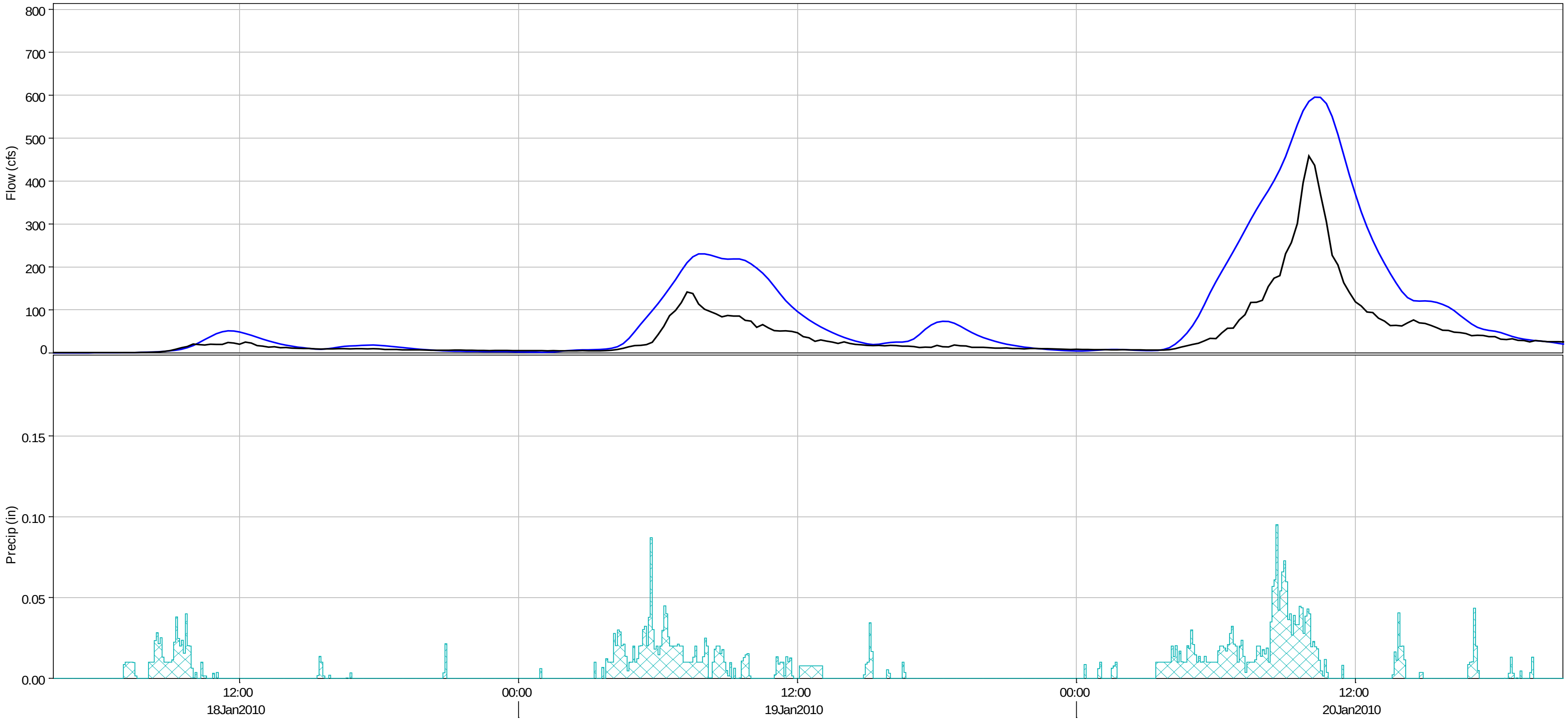
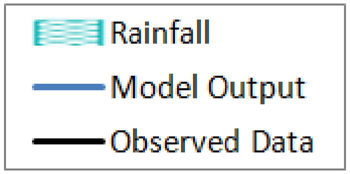


Figure 20: Los Trancos – January 2010



NOTE: *Los Trancos stream flow gage measurements are suspected to be low. Observed data should be used as a rough reference.*

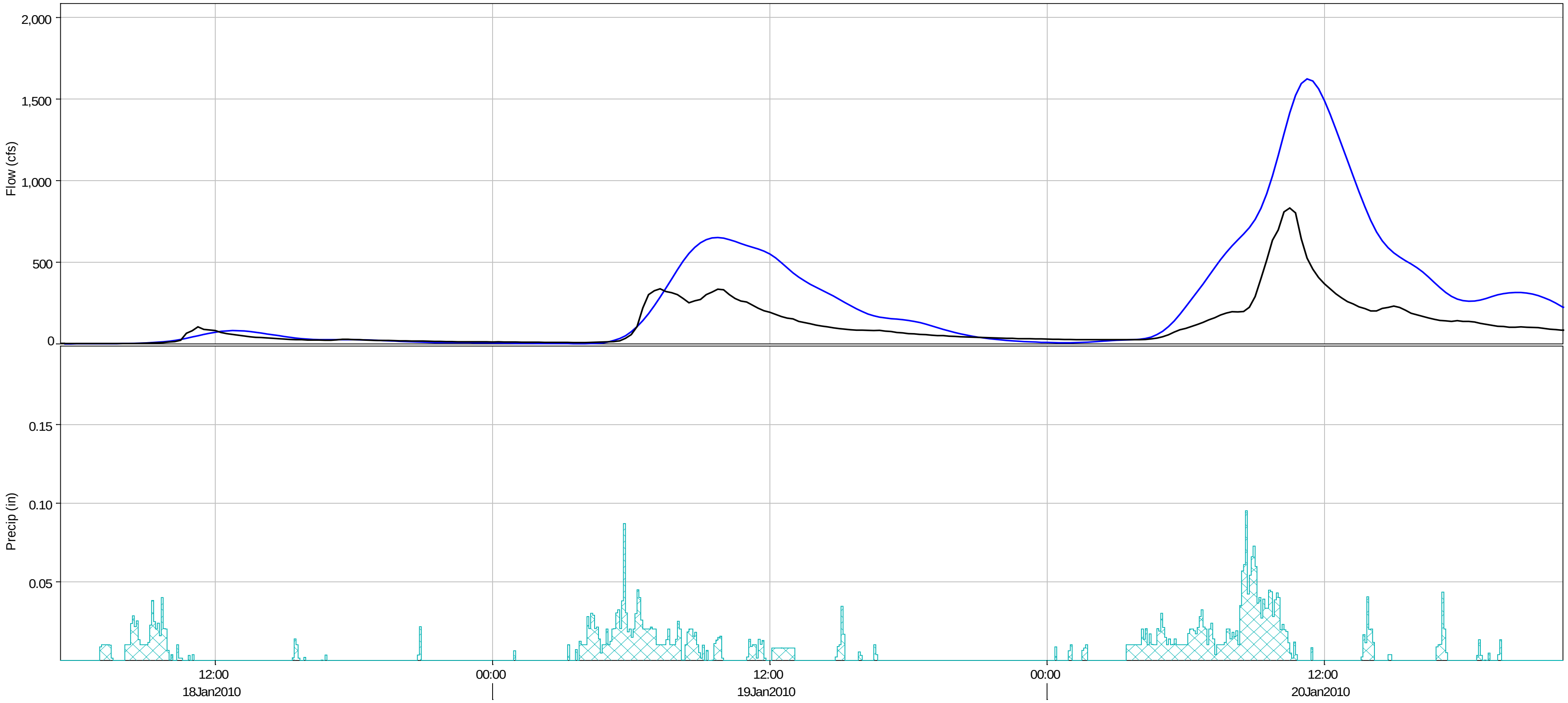


Figure 21: Bear – January 2010

NOTE: *Bear stream flow gage measurements are suspected to be low. Observed data should be used as a rough reference.*

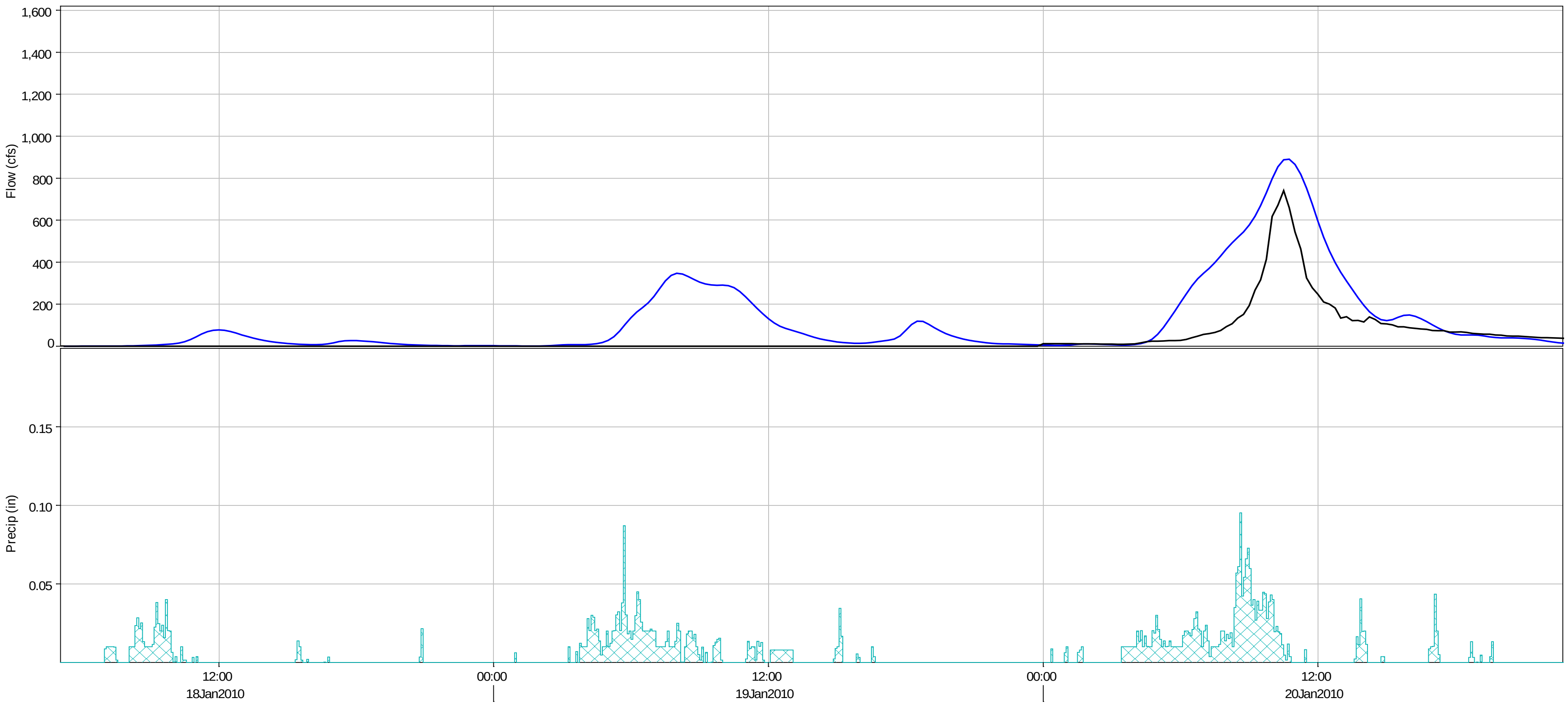


Figure 22: Corte Madera – January 2010

NOTE: *Stream gage located upstream of model catch point. Observed flow should be slightly lower than the model results.*

4.4. 22 MARCH 2011

Table 5: March 2011 Model Calibration Parameters

Sub-Area	AMC	Time of Concentration Q	Storage Coefficient (R) Ratio
Bear	2.0	Q10	0.5
Searsville	1.75	Q10	0.5
Los Trancos	2.0	Q10	0.5
USGS	2.0	Q10	0.5
Urban	2.0	Q10	0.5

**As described in Section 2.3.5 – numbers are based of observed flows at gaging points.*

Five gage locations were in operation for this storm event: USGS, Searsville Dam, Bear, Corte Madera, and Los Trancos. Similar to the 2010 calibration, there are possible gage errors stemming from Bear and Los Trancos. Therefore, the observed flows from these gages were not used as inputs. Downstream reference points relied solely on the model. However, Los Trancos gage matched perfectly with modeled output without any effort, which puts suspicion on the Bear gage.

Using the Searsville outflow, combined with Bear and Los Trancos watersheds at AMC 2.0, the modeled flow at the USGS gage matched very well with the observed data.

For the Searsville watershed, the only operational gage upstream was Corte Madera. The catch point in the model is downstream of the gage, and therefore a higher modeled flow would be expected. An AMC value of 1.75 computed a flow that is slightly larger than observed. Observed flows are in black. Modeled flows are shown in blue. A reference rainfall pattern over Searsville Lake is included under the hydrographs.

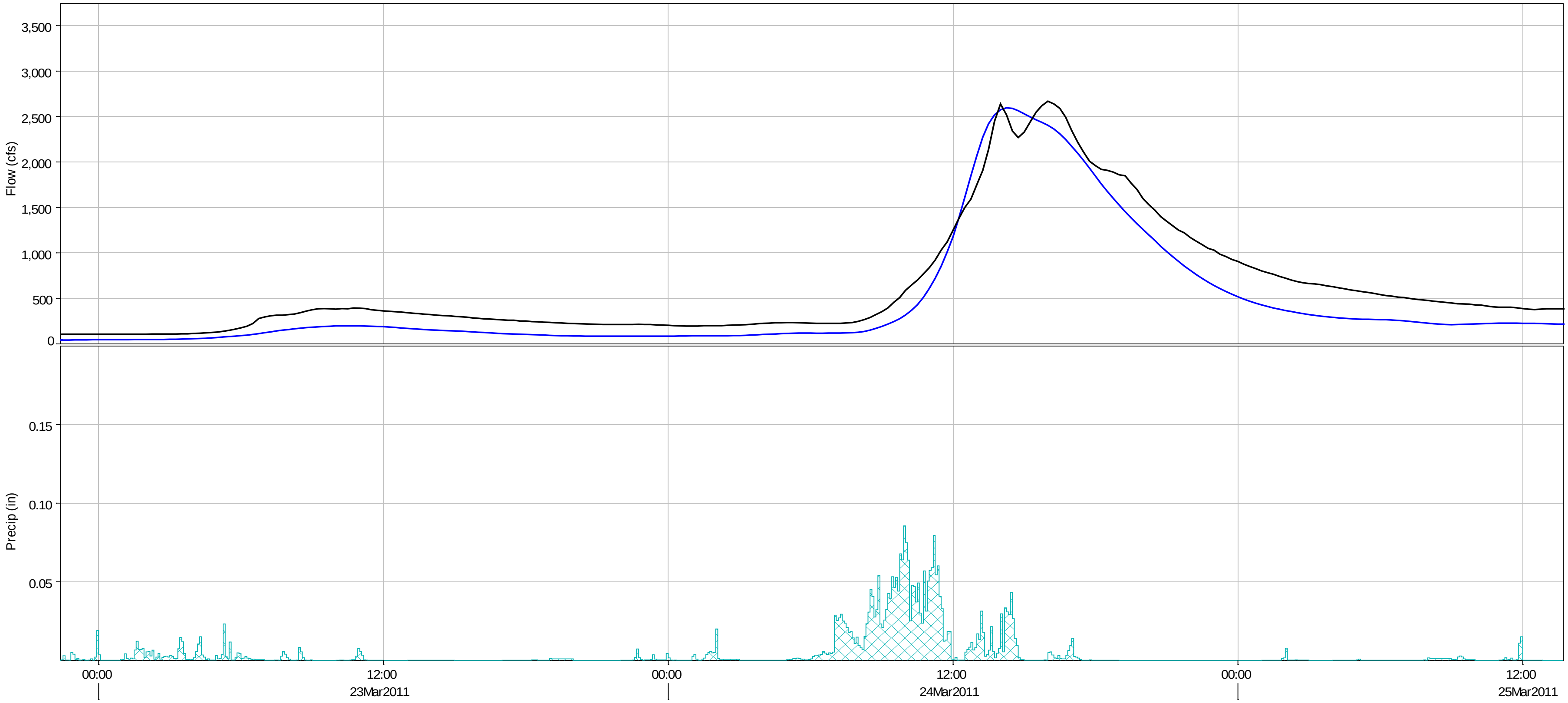


Figure 23: USGS – March 2011

NOTE: *Bear Creek and Los Trancos observed flow data were removed and not used as inputs in determining flow at USGS.*

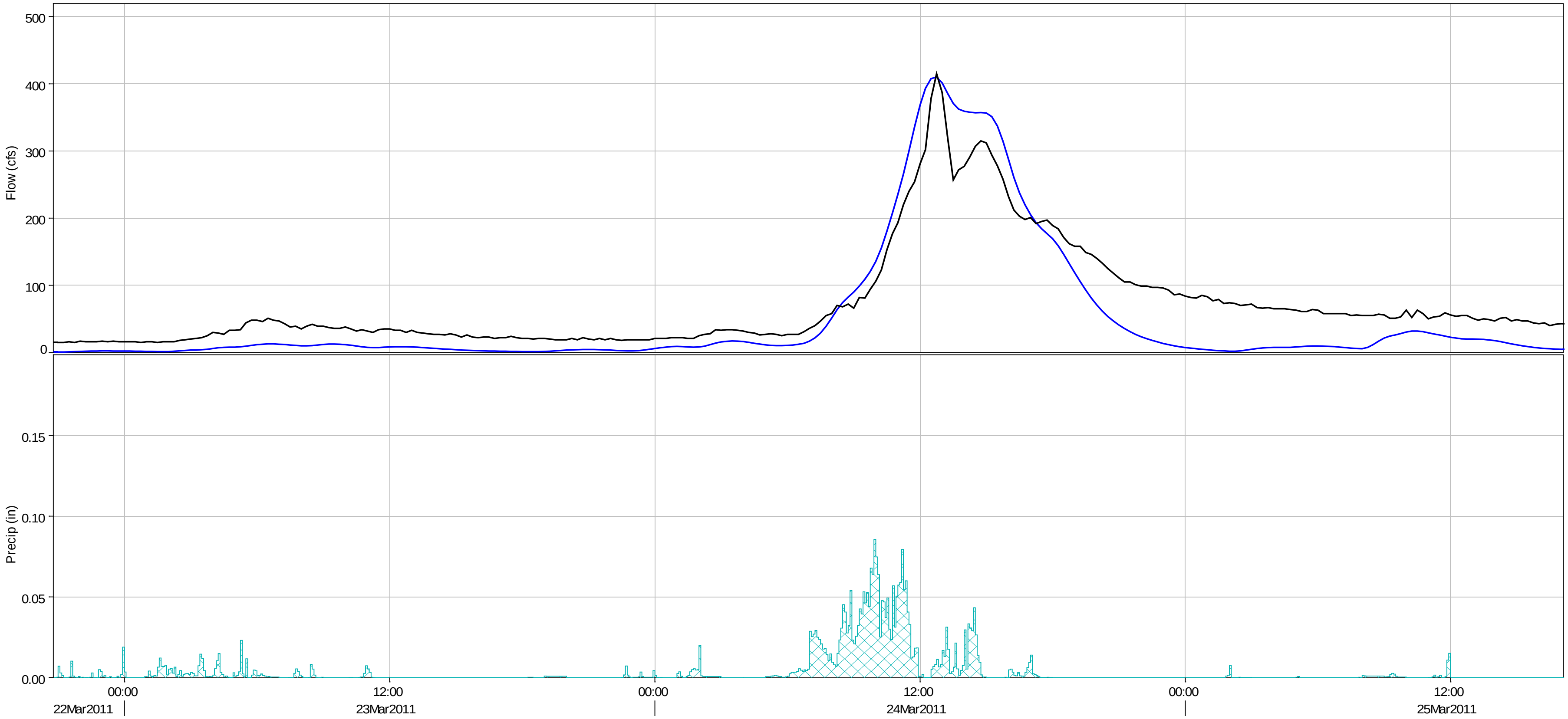


Figure 24: Los Trancos – March 2011

NOTE: *Los Trancos stream flow gage measurements might be suspect, quality unknown.*

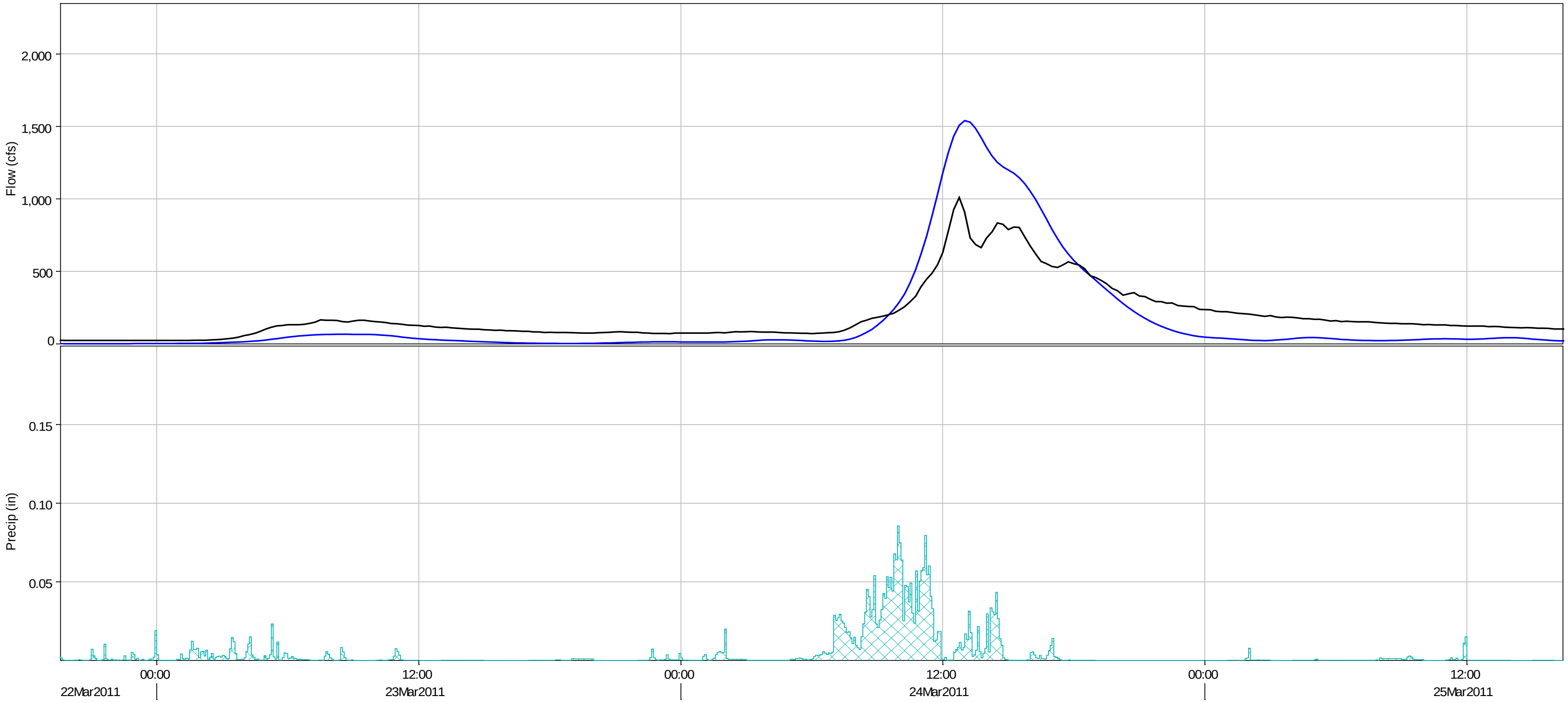
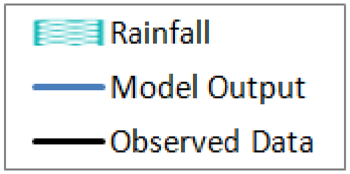


Figure 25: Bear – March 2011

NOTE: *Bear stream flow gage measurements are suspected to be low. Observed data should be used as a rough reference.*



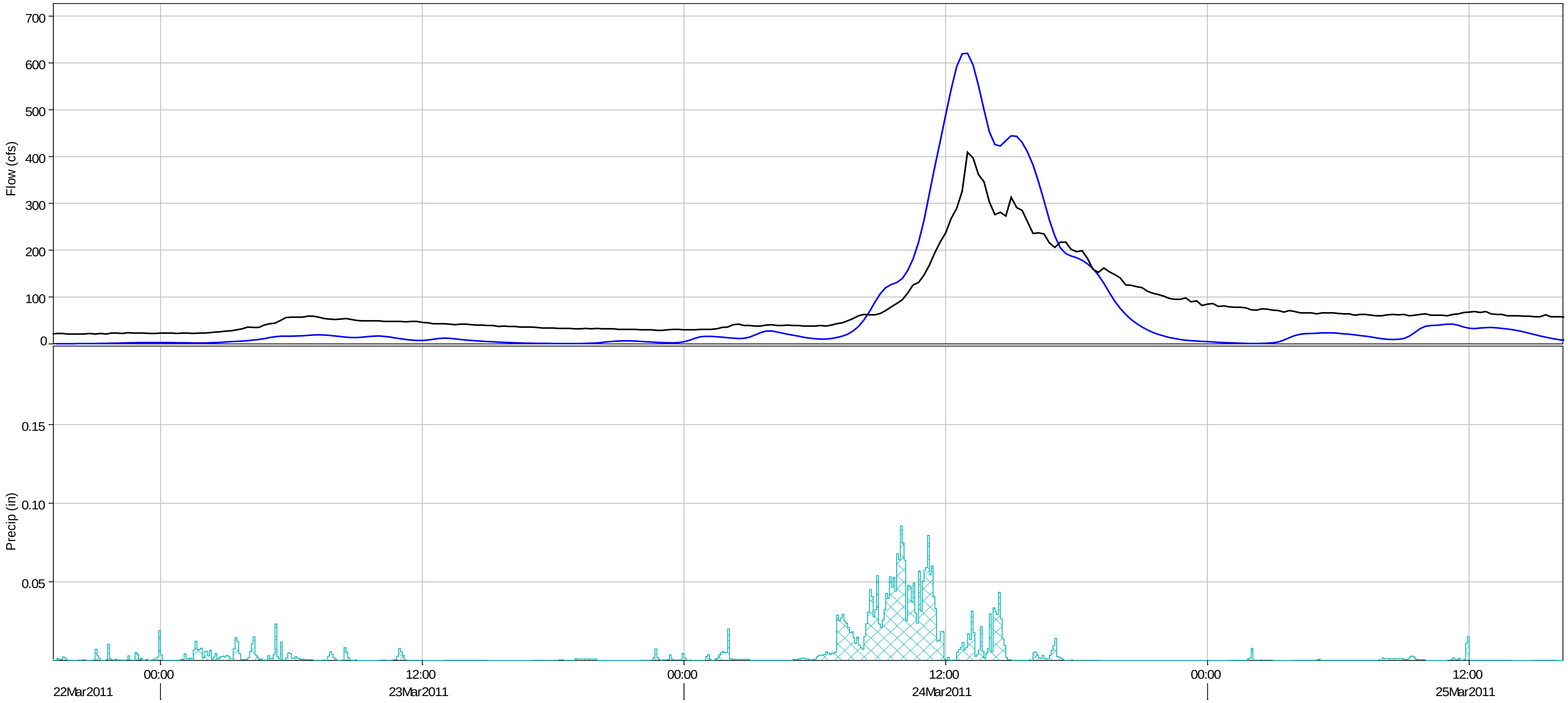


Figure 26: Corte Madera – March 2011

NOTE: *Stream gage located upstream of model catch point. Observed flow should be slightly lower than the model results.*

4.5. 21 DECEMBER 2012

Table 6: December 2012 Model Calibration Parameters

Sub-Area	AMC	Time of Concentration Q	Storage Coefficient (R) Ratio
Bear	2.5	Q200	0.5
Searsville	1.5 – 2.0	Q10	0.5
Los Trancos	1.5	Q10	0.5
USGS	2.0	Q10	0.5
Urban	2.0	Q10	0.5

**As described in Section 2.3.5 – numbers are based of observed flows at gaging points.*

Seven gage locations were in operation for this storm event: USGS, Searsville Dam, Bear, Corte Madera, Alambique, Dennis Martin/Sausal, and Los Trancos. Alambique gage experienced debris and clogged culvert issues, and therefore will only be used as reference. Alambique, Dennis Martin/Sausal, and Corte Madera gages are all upstream of Searsville Dam, and will be used to determine parameters for the Sub-Area Searsville.

For the Searsville watershed, Corte Madera sub-basins were given an AMC value of 2.0, while the rest of the northern sub-basins, including Alambique and Dennis Martin / Sausal, were given an AMC of 1.5 in the Searsville sub-area. This northern sub-area shares a boundary with Bear. It is likely that the rainfall error for Bear is also present in the northern Searsville sub-area as well.

The measured flow at the Bear Creek gage is very high, approaching a 200-year return period when using the USGS gage as a reference. AMC was set at 2.5, but the model could not reproduce the flows that were measured. Erroneous rainfall data is suspected, as a high stream flow at Bear is required to produce the flows seen at USGS. In addition, rainfall discrepancies are seen for sub-basins at higher elevations. This error probably stems from a District rain gage malfunction during this storm, which removed an important calibration point for the radar data. However, there is also a possibility of stream flow gage error, as the peak lasts for much longer, and the volume much higher at the USGS gage.

Using the Searsville outflow, combined with Bear and Los Trancos at an AMC 2.0, the modeled flow at the USGS gage matches the initial rising peak, but is not able to sustain the peak for very long.

Los Trancos is given an AMC of 1.5, and modeled flows are slightly higher than observed. Observed flows are in black. Modeled flows are shown in blue. A reference rainfall pattern over Searsville Lake is included under the hydrographs.

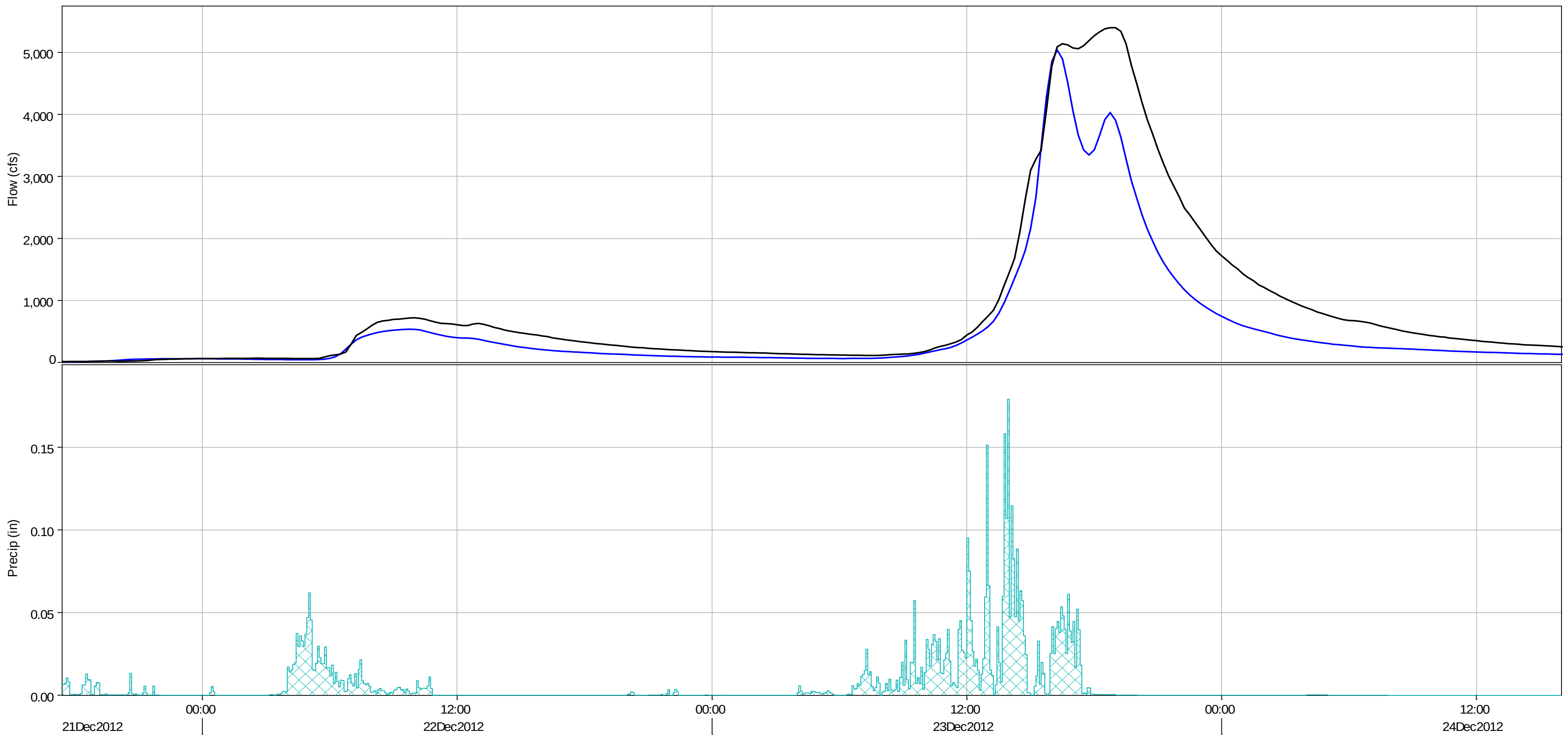


Figure 27: USGS – December 2012

NOTE: *Bear Creek and Los Trancos observed flow data were used as inputs in determining flow at USGS.*

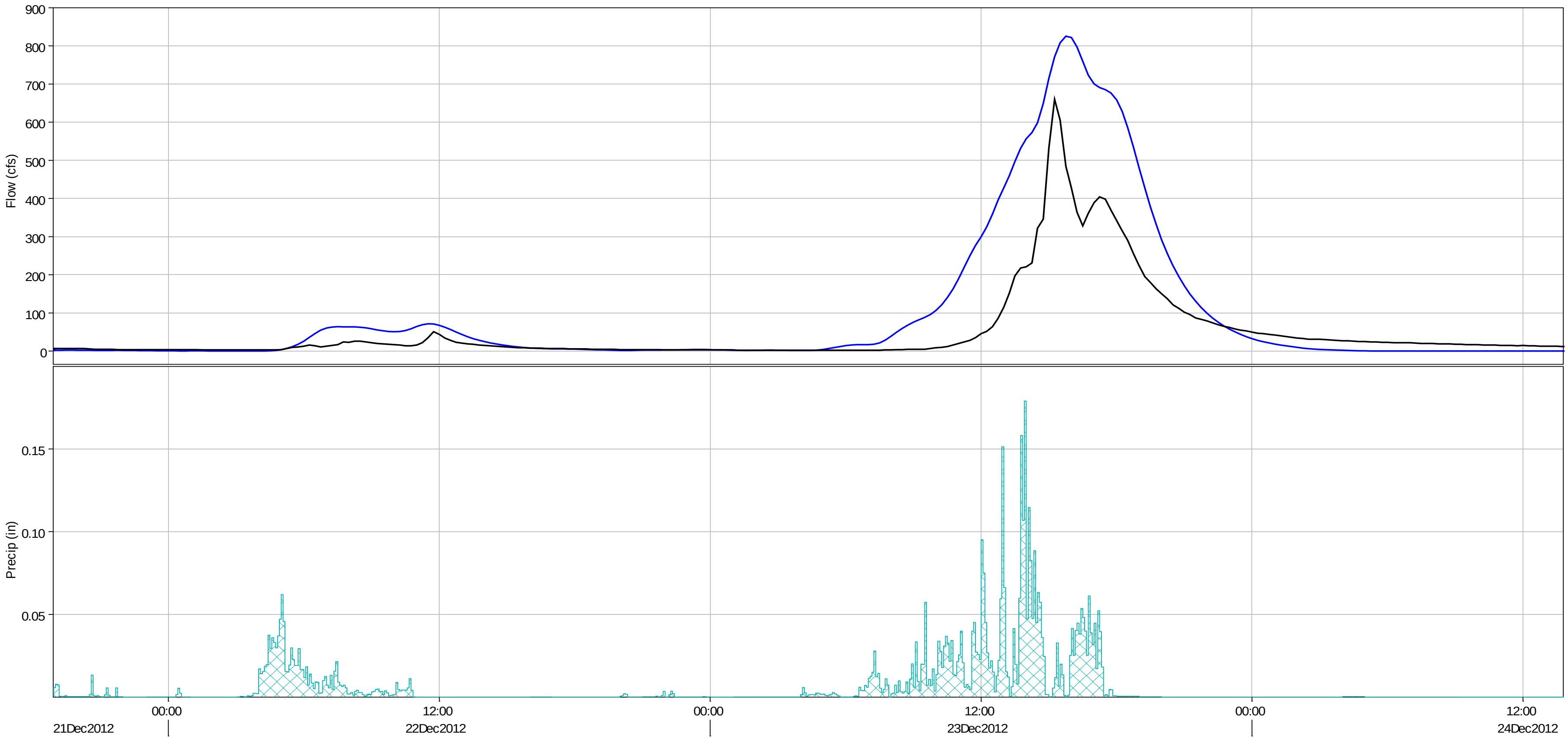


Figure 28: Los Trancos – December 2012

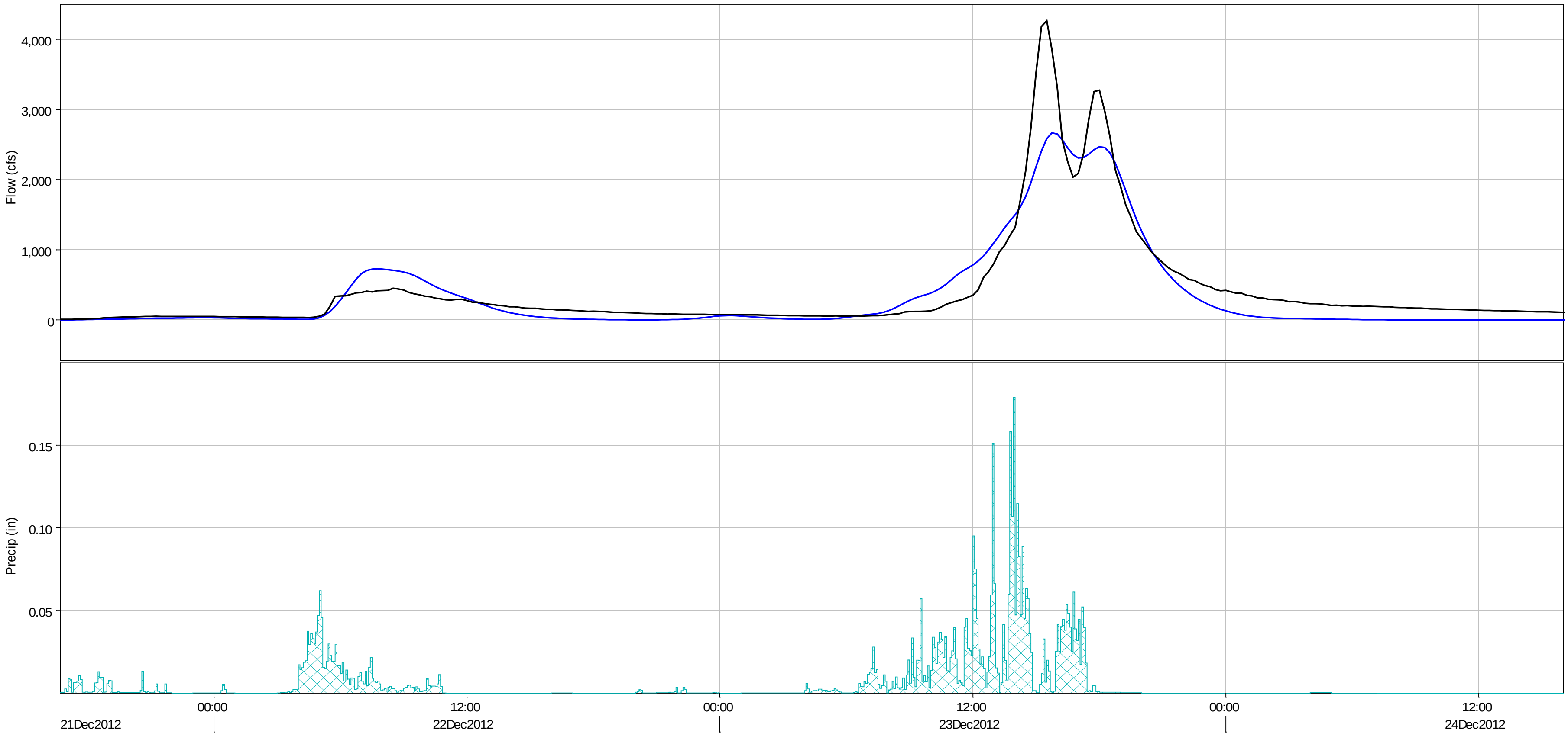


Figure 29: Bear – December 2012

NOTE: *Suspected rainfall data errors.*

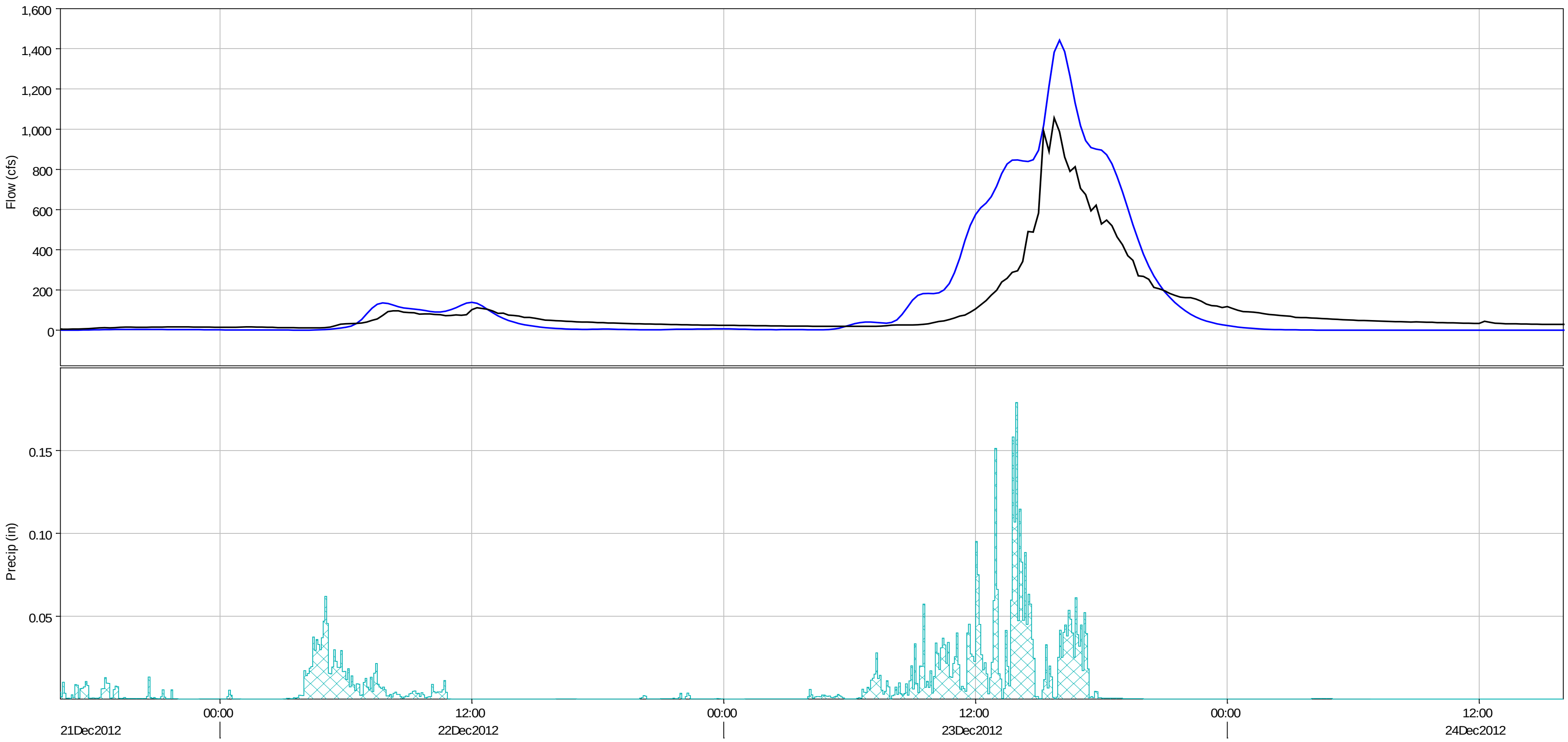


Figure 30: Corte Madera – December 2012

NOTE: *Stream gage located upstream of model catch point. Observed flow should be slightly lower than the model results.*

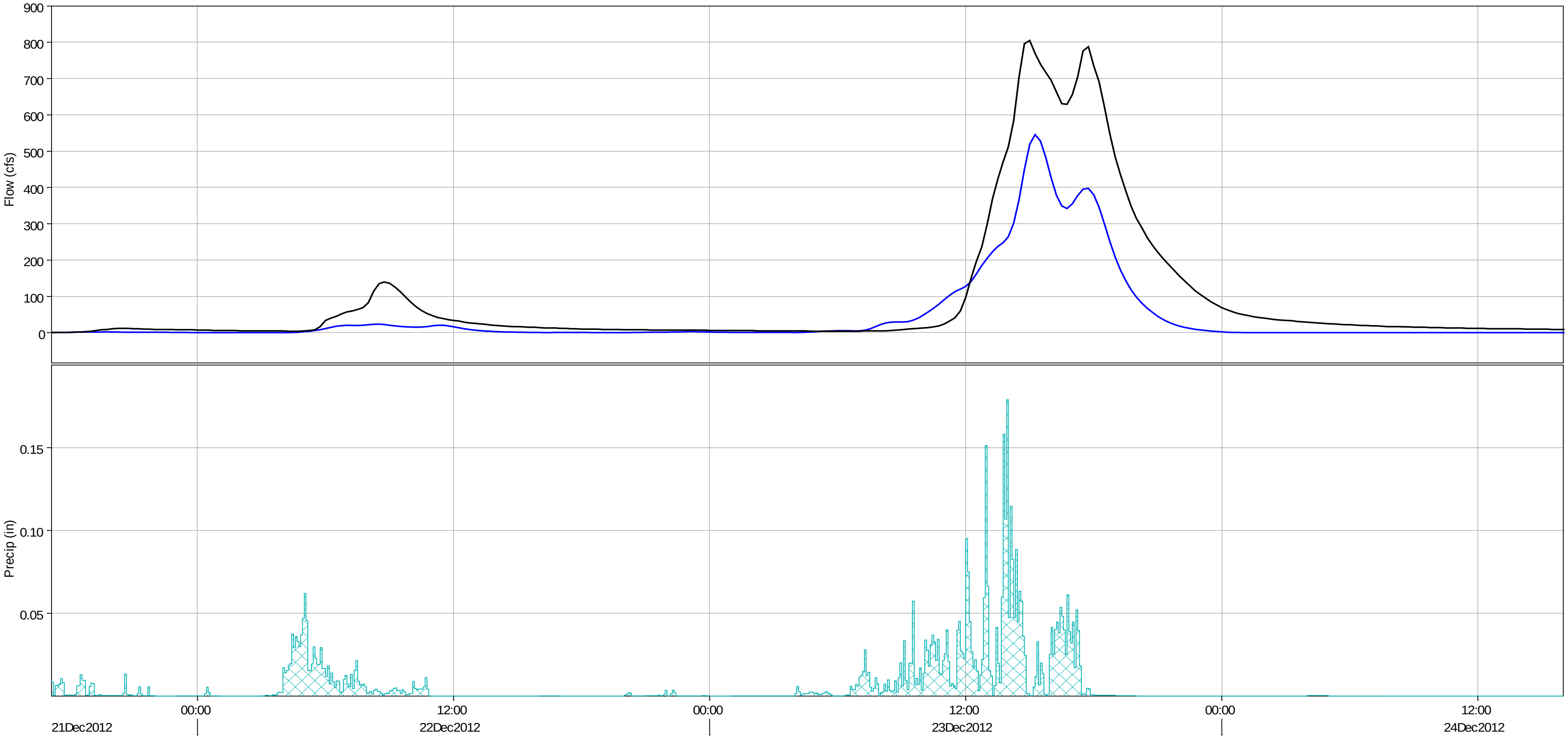
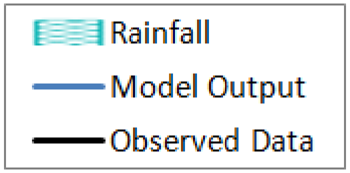


Figure 31: Dennis Martin / Sausal – December 2012

NOTE: *Suspected rainfall data errors.*



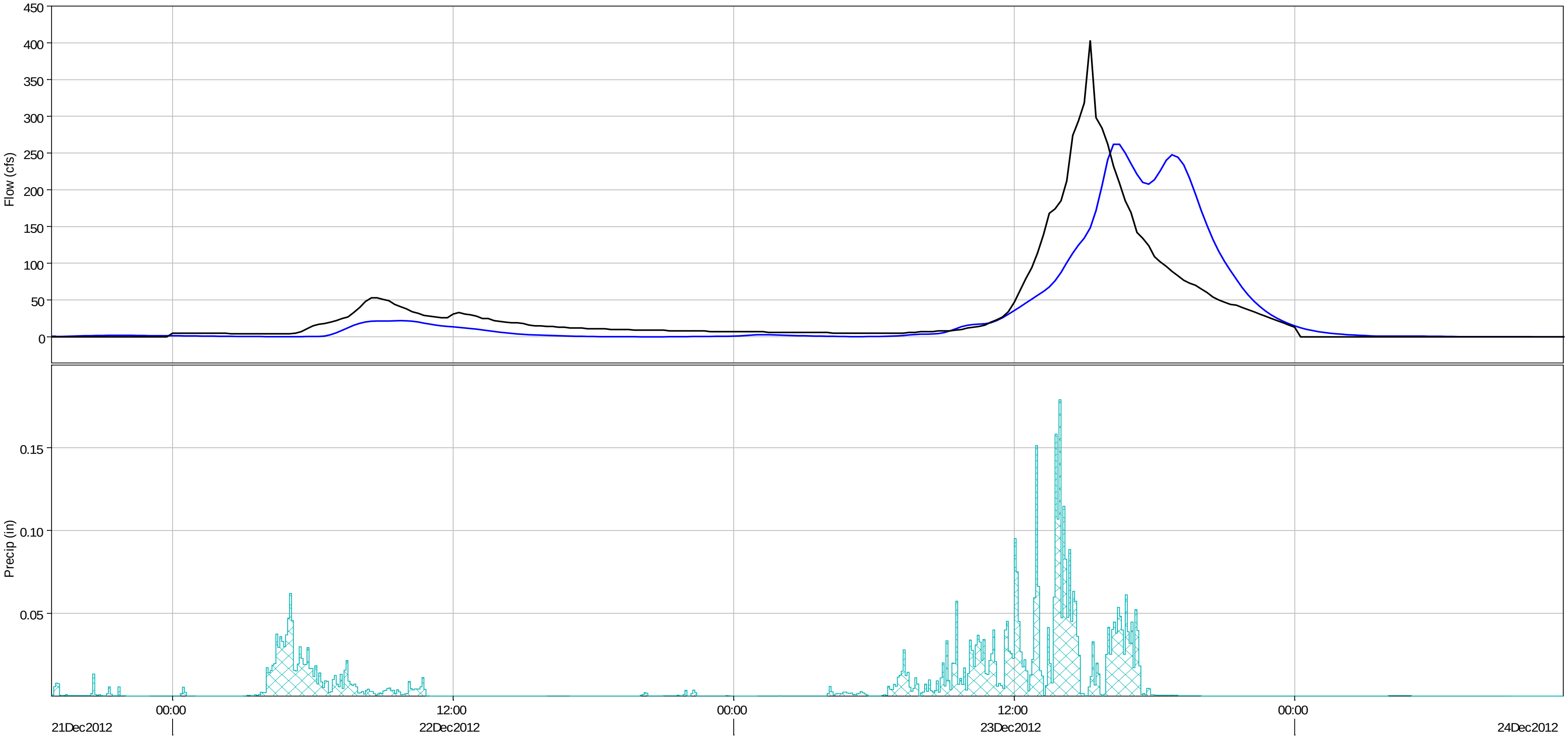


Figure 32: Alambique – December 2012

NOTE: *Culvert near gage clogged during storm. Observed flow data quality is poor at best, and determined from visual inspection. Rainfall data is also suspect.*

▤	Rainfall
—	Model Output
—	Observed Data

5. DESIGN STORM

5.1. PATTERN

Traditionally, the District has used a center-loaded 24-hour storm pattern based on rainfall statistics. This storm pattern is shown in Figure 32. However, a 72-hour storm pattern will also be used to account for the wetting behavior of Searsville Lake.

The storm of record for the entire county was in December 1955, and will be used as the basis for the 72-hr design storm. The storm pattern was modified by using precipitation frequency depths described in below. Depth durations of 1-hr, 2-hr, 3-hr, 6-hr, 12-hr, 24-hr, 48-hr and 72-hrs were used to ensure that within the 1955 pattern, each duration interval inside the design storm represented the statistically determined precipitation depths.

Rainfall depths are contingent upon mean annual precipitation (MAP) when using District rainfall equation, as explained in the next section. In lieu of creating a unique pattern for each sub-basin, the weighted-average MAP was determined for the entire watershed and used in the pattern modification for several reasons:

- The majority of the watershed is in the hills, and therefore does not have such a large variation in MAP compared with the valley.
- The differences in the patterns if each sub-basin was performed individually would be very slight, and from previous experience, not very sensitive.
- The design flow, regardless of rainfall depth and pattern, is calibrated to a gage FFA.

The aforementioned procedure was only done with 100-yr depths. The same pattern used for the 100-yr was adopted for the 10-yr design storm pattern for most of the same reasons listed above. The original 1955 storm pattern, as well as the modified storm pattern, is shown in Figure 33 and Figure 34.

5.2 RAINFALL DEPTH

NOAA-14 depths were not used to characterize the design storm. Previous hydrology studies using NOAA-14 rainfall depths yielded extremely high design flows, in many instances almost double the stream gage flood frequency analysis (FFA) flows. Similarly in this study, attempts to balance the flows by modifying model parameters became unreasonable. Therefore, The District's TDS regional equation is used to calculate the design rainfall depths. The District performed a statistical analysis on all forty rain gages within its jurisdiction to create the regression equation that can estimate precipitation for ungaged watersheds within this hydrometeorologic region.

Table 7 below compares 1% depths for both the 72-hr and 24-hr durations on all the San Francisquito sub-basins, and details the percent increase between the District and NOAA-14, which generally ranges from 20%-35%. Additionally, Table 8 compares the 1% depths between NOAA-14 and District statistical analysis for several durations at a District rain gauge that has been operating since 1966. Not only has the NOAA-14 depth increased for all durations, but the shorter duration depths now represent a higher percentage of the longer duration depths. The second point is important when producing the design storm pattern, and will increase the intensity design storm pattern at the peak, causing more runoff.

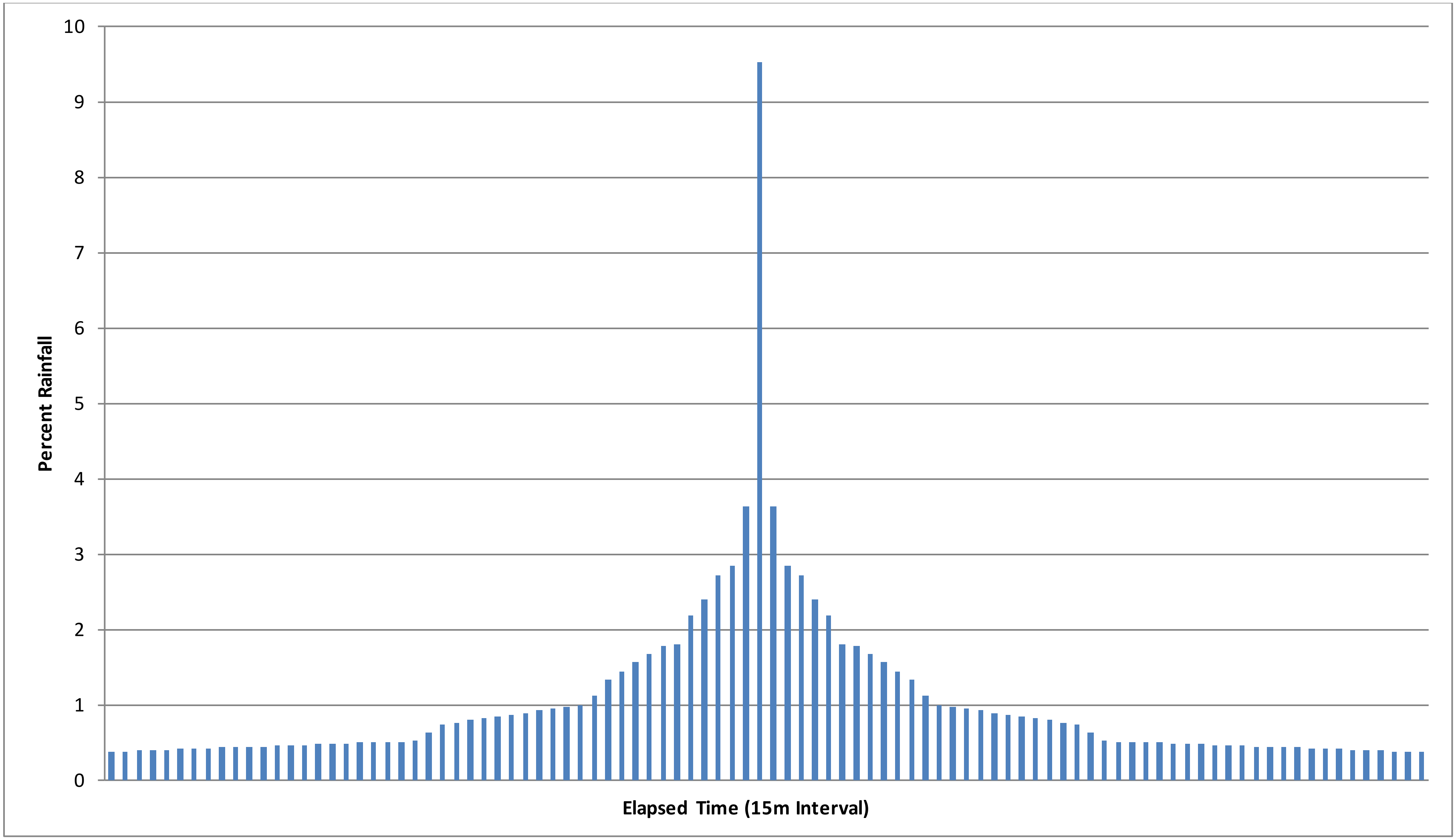


Figure 33: 24-hr Design Storm Pattern

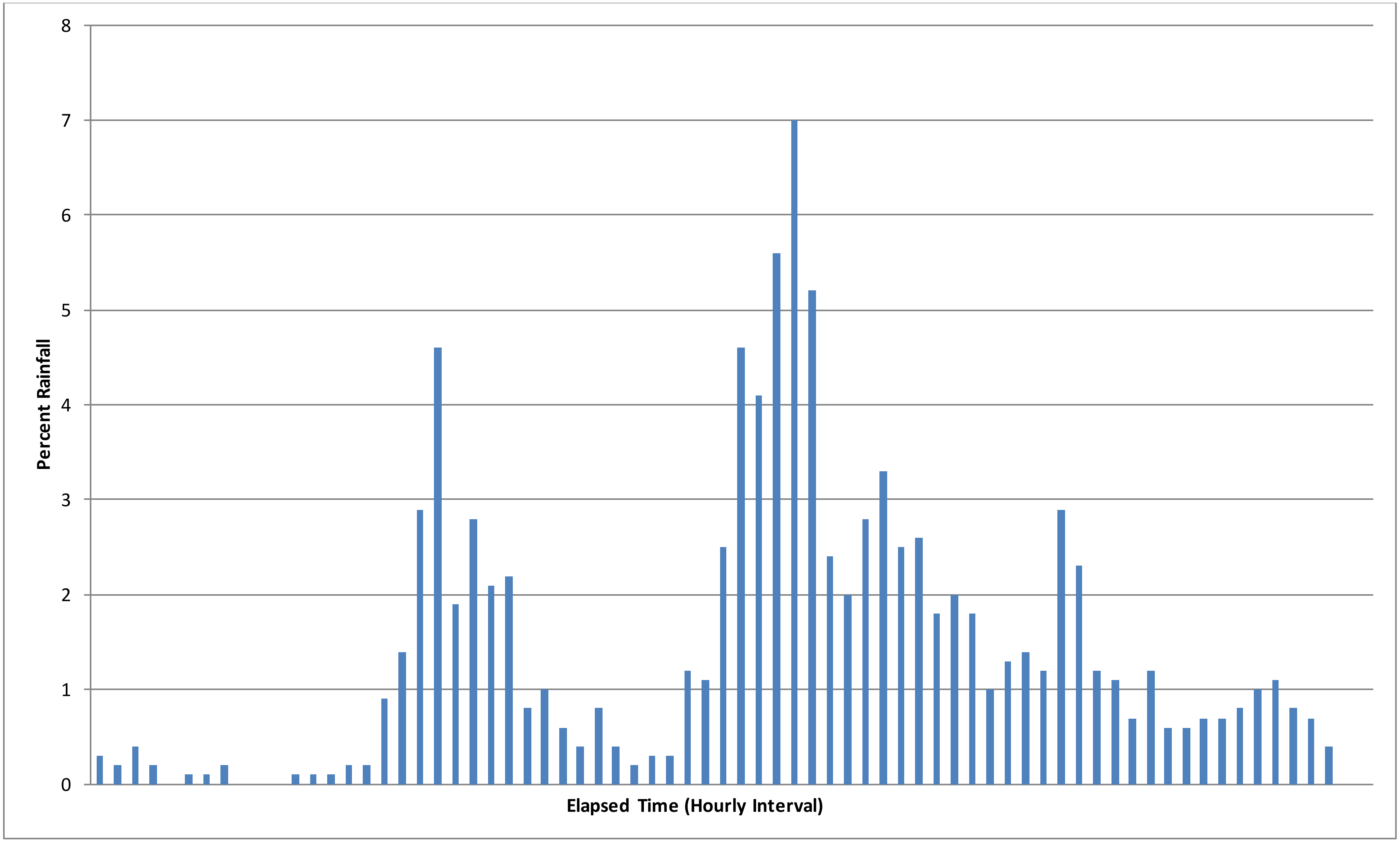


Figure 34: 1955 Storm Pattern

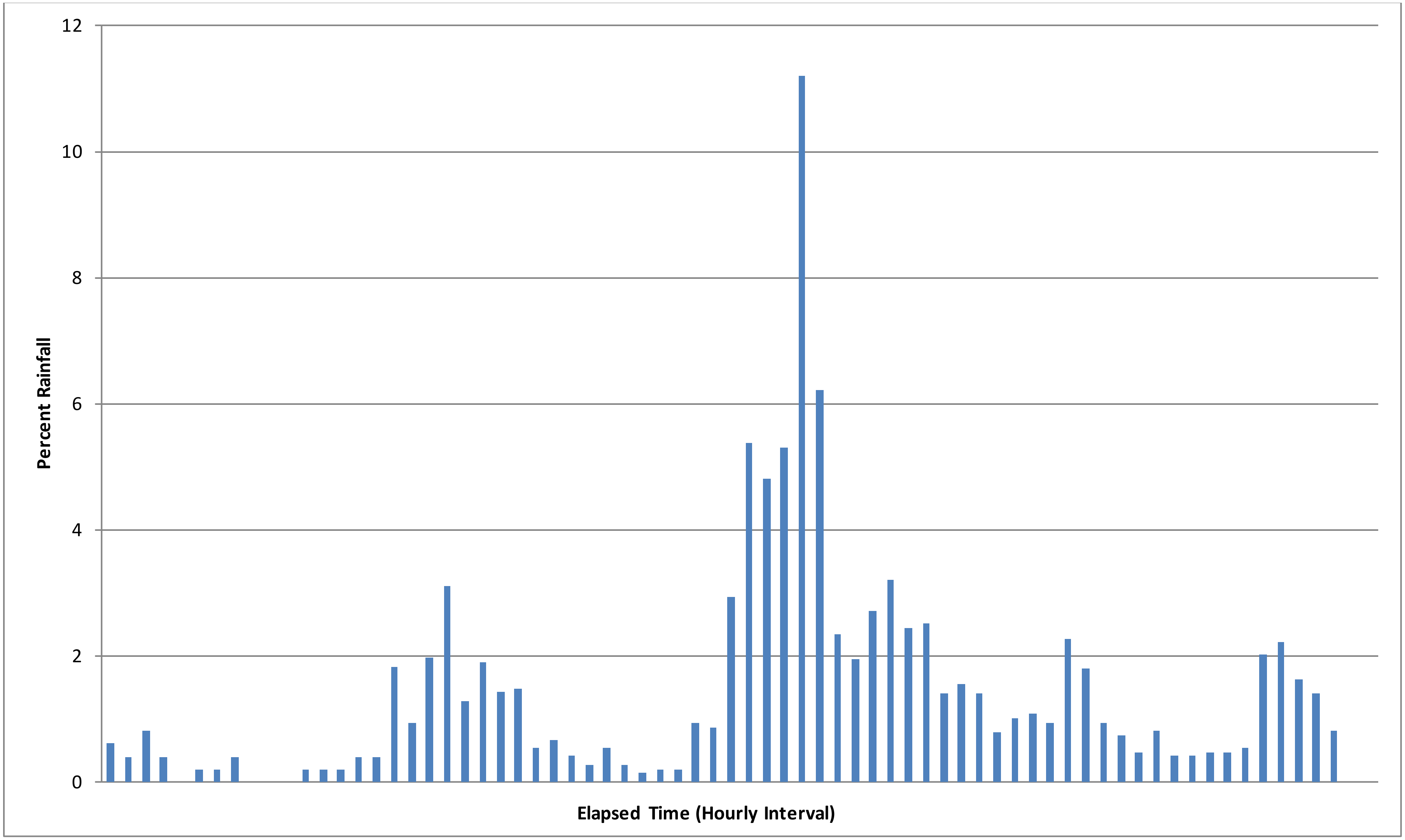


Figure 35: 72-hr Design Pattern

Table 7: Rainfall Depth Comparison

Basin ID	1% 72-hr			1% 24-hr		
	TDS	NOAA-14	% Increase	TDS	NOAA-14	% Increase
SFQ_AA14	8.34	11.4	36.7%	5.504	7.59	37.9%
SFQ_AA15	8.687	11.6	33.5%	5.727	7.58	32.4%
SFQ_A1	10.297	13.97	35.7%	6.76	9.16	35.5%
SFQ_A2	10.73	14.58	35.9%	7.038	9.46	34.4%
SFQ_BB11	9.363	12.27	31%	6.161	7.91	28.4%
SFQ_BB13	8.383	11.43	36.3%	5.532	7.43	34.3%
SFQ_B1	11.053	13.81	24.9%	7.245	8.76	20.9%
SFQ_C1	10.237	13.9	35.8%	6.722	8.89	32.3%
SFQ_C6	10.818	14.9	37.7%	7.095	9.51	34%
SFQ_D	10.677	14.56	36.4%	7.004	9.35	33.5%
SFQ_E	8.974	12.32	37.3%	5.911	7.97	34.8%
SFQ_F	7.676	10.2	32.9%	5.078	6.72	32.3%
SFQ_G1	10.049	12.05	19.9%	6.601	7.71	16.8%
SFQ_G2	9.163	11.1	21.1%	6.033	7.21	19.5%
SFQ_G3	7.649	9.92	29.7%	5.061	6.52	28.8%
SFQ_G4	8.197	9.91	20.9%	5.413	6.5	20.1%
SFQ_G5	7.347	9.14	24.4%	4.867	6.07	24.7%
SFQ_G6	6.784	8.69	28.1%	4.506	5.81	28.9%
SFQ_H	6.343	8.33	31.3%	4.223	5.62	33.1%
SFQ_I	6.226	8.12	30.4%	4.148	5.51	32.8%
SFQ_J1	5.961	7.84	31.5%	3.978	5.32	33.7%
SFQ_J2	5.624	7.52	33.7%	3.762	5.14	36.6%
SFQ_K	5.59	7.13	27.5%	3.74	4.96	32.6%
SFQ_L	5.565	6.87	23.5%	3.724	4.77	28.1%
SFQ_M	5.39	6.43	19.3%	3.612	4.52	25.1%
SFQ_N	5.151	6.06	17.6%	3.459	4.3	24.3%
SFQ_O	4.813	5.89	22.4%	3.242	4.2	29.5%

Table 8: Rainfall Depth and Percentage Comparison for Dahl Ranch Gauge

	1% Depth (and Percent)	
Duration	SCVWD Gauge Stats	NOAA-14
72-Hr	9.67	11.82
24-Hr	6.27	7.56
6-Hr	3.06	4.47
% of 72-hr	32%	38%
% of 24-hr	49%	59%
1-Hr	1.05	1.69
% of 72-hr	11%	14%
% of 24-hr	17%	22%

The total precipitation for a given storm duration and frequency can be determined from the following TDS equation published by the District[16].

$$P_{f,d} = A_{f,d} + B_{f,d} \times MAP$$

Where:

$P_{f,d}$ = Precipitation depth in inches for a given f, frequency (%) and d, duration (hours).
$A_{f,d}$ & $B_{f,d}$ = Regression constants and coefficients given in the table below
MAP = Mean annual precipitation, in inches, from SCVWD

Table 9: TDS Equation Constants

	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr	48-hr	72-hr
A (1%)	0.5074	0.5317	0.498	0.3228	0.2588	0.1102	0.3239	-0.0876
B (1%)	0.019	0.0389	0.0579	0.1082	0.1613	0.217	0.2751	0.3382
A (10%)	-	-	-	-	-	0.0028	-	-0.1569
B (10%)	-	-	-	-	-	0.1653	-	0.2552

Precipitation depth was calculated individually for each sub-basin in the hydrologic model using the TDS equation shown above due to the variation of MAP. TDS equations for the 10-year recurrence event were only used for the full 24-hr and 72-hr depths, as the other durations were not required since the pattern was already created using the 100-year event.

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[16] SCVWD 2013. Precipitation Gage Data and Depth-Duration-Frequency Analysis. Revised from Saah et al, 2004

5.3 DEPTH AREA REDUCTION FACTOR (DARF)

When accounting for spatial variation in rainfall depth over a large watershed, DARFs are commonly used. As the study area increases in size, there is a decrease in rainfall depth. To properly account for the spatial variation, the depth-area reduction table 13.3 in HMR 59[17] was used. HMR 59 analyzed the largest recorded storms in California to produce the DARFs. Values between the discrete points in the table were interpolated linearly. For San Francisquito, all depths were multiplied by 92.1%, which represents the DARF for a watershed area of 44.95 square miles.

5.4 SEARSVILLE LAKE

To properly model the hydraulic effects of Searsville Lake, a 2D model was used to route flows from the upper lake to the dam spillway. Output from the hydrologic model was used as input to the hydraulic 2D model, and the resulting output used as dam outflow for the hydrologic model.

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[17] NOAA. Hydrometeorological Report No. 59. Probable Maximum Precipitation for California, February 1999.

6. FLOOD FREQUENCY ANALYSIS (FFA)

6.1. DATA

The only stream gage with a significant historical record to perform a FFA is the USGS gage #11164500 at the Stanford golf course. This gage began measuring stream flow in 1932 and has since maintained a continuous length of record, except for a gap from 1942 to 1950. To date, there are 73 annual peak discharges over a period of 83 years.

Stream gage data was downloaded from the USGS National Water Information System[18] (NWIS). Analysis was performed using USGS PeakFQSA[19] software, which also includes an automatic low outlier test improved upon from the original Bulletin 17B, also known as 17C[20]. Gage analysis was performed using a weighted skew, with regional skews determined by USGS SIR 2010-5260[21], which followed the following equation:

$$Regional\,Skew = -0.62 + 1.3\,[\,1 - e^{(-Mean\,Basin\,Elevation/6500)^2}\,]$$

Input parameters are listed below in Table 8. Station skew was calculated by the PeakFQSA program and varied depending on the outlier selection.

Table 10: USGS Gage Regional Skew & Mean Square Error

Location	Average Basin Elev	Skew	Mean Square Error
USGS Gage 11164500	953’	-0.60	0.14

6.2 RESULTS

Analysis was performed with two separate low-outlier test methods. The first was the Multiple Grubbs-Beck Test (MGBT) method, which is the default 17C method. The second MGBT method calculated a low-outlier threshold of approximately 1,600cfs. To test sensitivity, a manual low-outlier threshold of 139cfs was used based on visual examination of the data set. Both methods produced similar 100-year flows. 100-yr flows for both methods can be seen in Table 9. Graphs can be seen below in Figure 35 for the MGBT and Figure 36 for the manual threshold. Final FFA results for the MGBT method are in Table 9.

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[18] http://nwis.waterdata.usgs.gov/nwis

[19] Tim Cohn, USGS. PeakFQSA Version 0.998. Flood Frequency Analysis with the Expected Moments Algorithm

[20] Recommended Revisions to Bulletin 17B. June 12, 2013. Subcommittee on Hydrology, Advisory Committee on Water Information. Hydrologic Frequency Analysis Work Group (HFAWG) Memorandum.

[21] Parrett, C., Veilleux, A., Stedinger, J.R., Barth, N.A., Knifong, D.L., and Ferris, J.C., 2011, Regional skew for California, and flood frequency for selected sites in the Sacramento–San Joaquin River Basin, based on data through water year 2006: U.S. Geological Survey Scientific Investigations Report 2010–5260, 94 p.

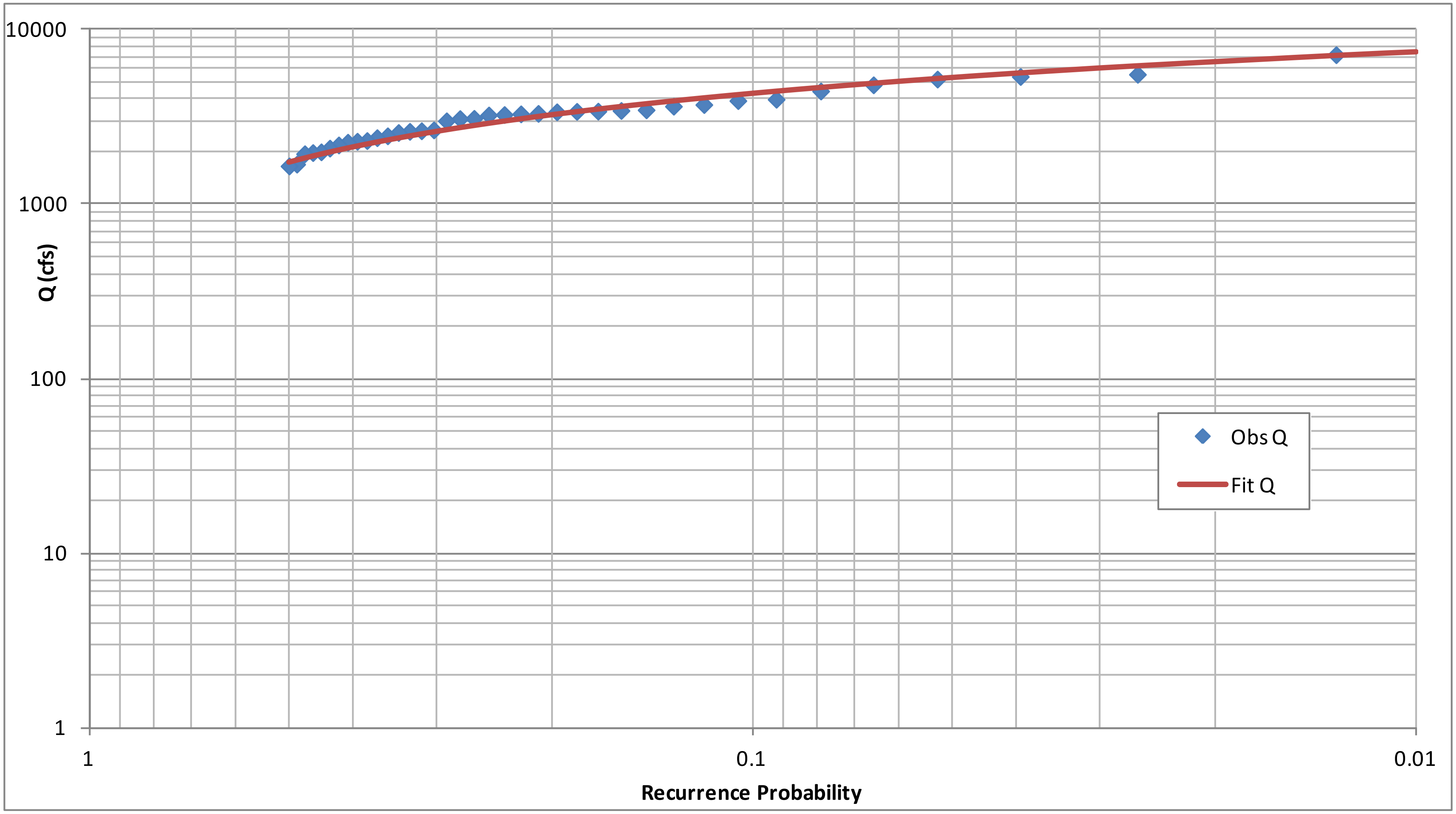

Figure 36: USGS Gage FFA Plot (MGBT)

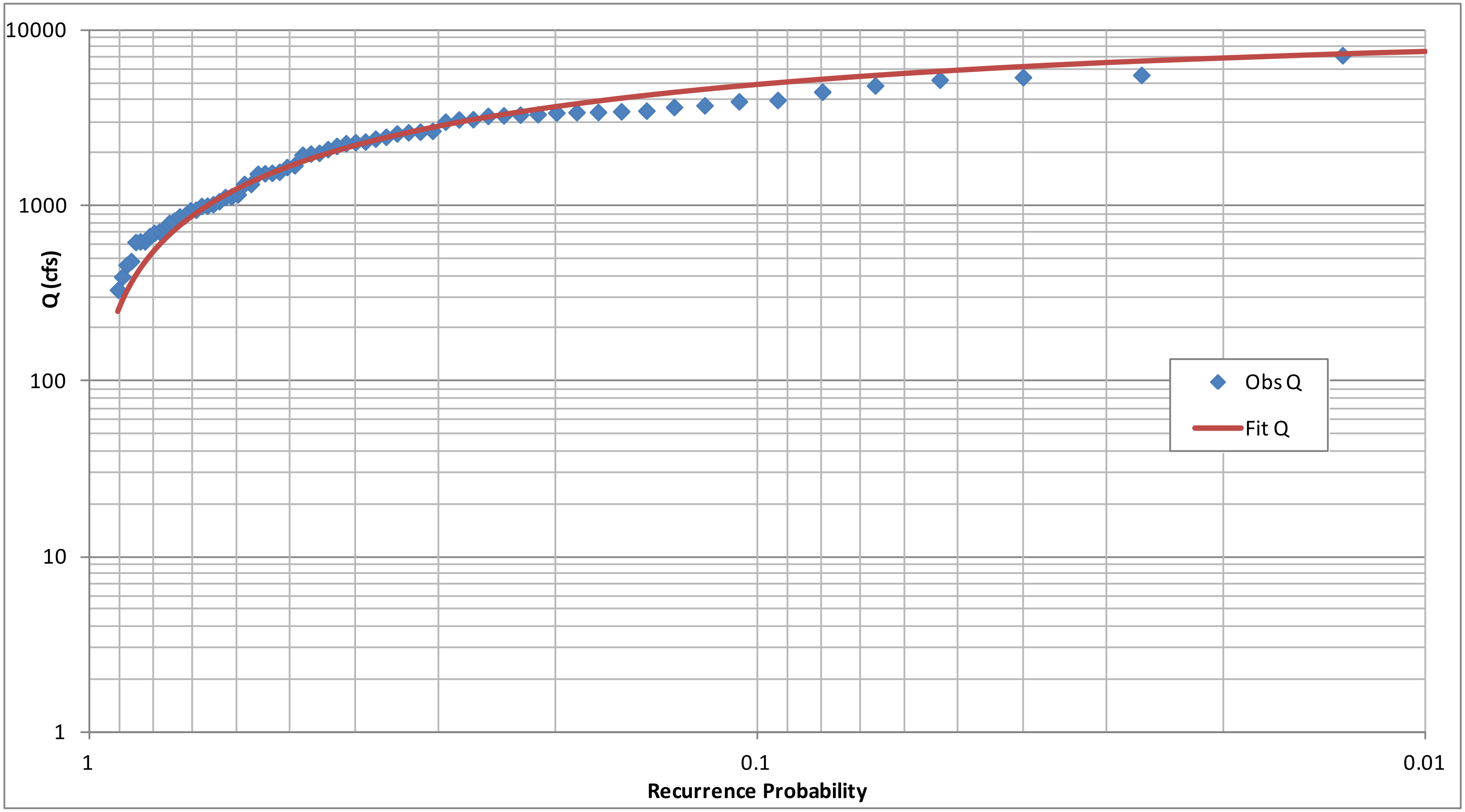

Figure 37: USGS Gage FFA Plot (139cfs Minimum Threshold)

Table 11: USGS Gage 11164500 FFA (MGBT)

Recurrence	Q Flow (cfs)
500yr	9,456cfs
200yr	8,382cfs
100yr	7,519cfs
50yr	6,612cfs
25yr	5,660cfs
10yr	4,330cfs
5yr	3,261cfs
2yr	1,734cfs

6.3 PREVIOUS INDEPENDENT ANALYSES

Two separate independent FFA studies were previously completed for the same gage. The first was a part of the Palo Alto Flood Basin Study by Shaaf and Wheeler in 2014[22]. The second was SIR 2010-5260, a study by the USGS in 2010 on all stream gages within the state of California that presents the most recent regional regression equations. Values vary slightly, due to additional data points, regional skew values, and low-outlier tests. However, all values are reasonably close. Table 10 below compares the different values.

Table 12: USGS Gage 100-yr FFA Comparisons

Study	Q100
Current Study (MGBT)	7,519cfs
Current Study (Manual Threshold)	7,547cfs
USGS SIR 2010-5260	7,690cfs
Shaaf & Wheeler PAFB	7,810cfs

6.4 SEARSVILLE DAM

The historical peak flows recorded by the USGS gage are influenced by the presence of Searsville Dam on the system. It is evident from recent large events that the lake and the dam provide a level of flood protection. However, given the dynamic change of the lake through sedimentation and the resulting topographic change upstream of the lake, it is not clear how the dam has affected the measured flows since the advent of the USGS gage.

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[22] Schaaf & Wheeler. Palo Alto Flood Basin Hydrology. July 2014. Prepared for SCVWD.

The prevailing thought is that as time passed, the lake gradually filled up with sediment, reducing the storage, and thereby increasing runoff downstream. Therefore, it is expected that the annual peak flows measured at the USGS gage would be higher in the past if Searsville Lake and dam, in its current state, was present. This might make our current FFA slightly low given the current conditions. However, this theory has not been verified. To offset this possible uncertainty, the design flow should be set conservatively higher than the results of the FFA.

7. DESIGN FLOWS

7.1. DESIGN MODEL PARAMETERS

Two design storm durations were used to ensure that the most conservative effect of Searsville Lake was captured. Although the design model will be calibrated to FFA value at the USGS gage, other catch points upstream of the gage do not have an index point and might be affected by storm duration.

For the 24-hr design storm pattern, an AMC of 1.65 was used. For the 72-hr design storm pattern, an AMC of 1.4 was used. Time of concentration values were based on a Q100 flows based on USGS regional regression values for each sub-basin, similar to the method used during model calibration. Storage coefficient ratios were left at 0.5 for all sub-basins.

A secondary HEC-HMS basin geometry was created as a “no Searsville lake” option. This model contained a few extra routing reaches to account for the distance in the HEC-RAS 2D model. This basin geometry was used to determine Searsville inflow values, as the Searsville tributaries in the original geometry was disconnected to allow the routing to be performed in the 2D model.

7.2 RESULTS

Model results for both the 24-hr and 72-hr design storms are below. The higher flow value between the two storms will be used as the final design storm.

Table 13: SFC 100-yr Design Model Output

Location	HEC-HMS ID	Q100 (24-hr AMC 1.65)	Q100 (72-hr AMC 1.4)	Final Design Flows
Searsville Inflow	SFQ_E_Lake	4,087	4,261	4,261
Searsville Outflow	Searsville Gage	2,938	3,022	3,022
Bear Creek U/S SFC	SFQ_AA15_Junction	2,863	2,883	2,883
Los Trancos U/S SFC	SFQ_G6_Junction	1,508	1,520	1,520
SFC U/S Los Trancos	SFQ_F_Junction	6,178	6,257	6,257
USGS	SFW_H_USGS_Junction	7,575	7,633	7,633
Pope Chaucer	SFQ_M_Junction	8,146	8,134	8,146
US-101	SFQ_N_Junction	8,404	8,352	8,404

Table 14: SFC 10-yr Design Model Output

Location	HEC-HMS ID	Q10 (24-hr AMC 1.65)	Q10 (72-hr AMC 1.4)	Final Design Flows
Searsville Inflow	SFQ_E_Lake	2,373	2,360	2,373
Searsville Outflow	Searsville Gage	1,690	1,690	1,690
Bear Creek U/S SFC	SFQ_AA15_Junction	1,768	1,784	1,784
Los Trancos U/S SFC	SFQ_G6_Junction	920	934	934
SFC U/S Los Trancos	SFQ_F_Junction	3,606	3,668	3,668
USGS	SFW_H_USGS_Junction	4,434	4,473	4,473
Pope Chaucer	SFQ_M_Junction	4,813	4,802	4,813
US-101	SFQ_N_Junction	4,976	4,943	4,976

7.3 FINAL FLOWS

Using the computed 10-yr and 100-yr design flows, interpolation and extrapolation was performed using Log-Pearson Type III methodology described in Bulletin 17B[23]. The general distribution fit is defined by the following equation:

$$Log\ Q = \bar{X} + K \times S$$

In this case, the flow variable Q is known for the 1% and 10% frequencies, as well as the constant factor K that is obtained from Appendix 3 of Bulletin 17B given a general skew coefficient G, which is determined to be -0.60. That leaves X-bar and S as two unknowns that can be solved.

Final design flows, along with associated K, S, and X-bar values can be seen in Table 13.

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[23] Guidelines for Determining Flood Flow Frequency– Bulletin #17B of the Hydrology Subcommittee. Interagency Advisory Committee on Water Data. Revised 1981. Editorial Corrections March 1982. USGS.

Table 15: Final Design Flows

	Recurrence Interval								Calculated Values	
Location	**2.33-Yr**	**5-Yr**	**10-Yr**	**25-Yr**	**50-Yr**	**100-Yr**	**200-Yr**	**500-Yr**	**S**	**X-bar**
Searsville Inflow	1,080	1,780	2,380	3,140	3,700	4,270	4,760	5,420	0.36963	2.93164
Searsville Outflow	780	1,270	1,690	2,230	2,630	3,030	3,370	3,840	0.36701	2.78738
Bear Creek U/S SFC	940	1,410	1,790	2,250	2,570	2,890	3,160	3,510	0.30309	2.88760
Los Trancos U/S SFC	490	740	940	1,180	1,350	1,520	1,670	1,860	0.30752	2.60124
SFC U/S Los Trancos	1,790	2,820	3,670	4,740	5,500	6,260	6,920	7,790	0.33724	3.15965
USGS	2,180	3,430	4,480	5,780	6,710	7,640	8,440	9,500	0.33747	3.24554
Pope Chaucer	2,370	3,710	4,820	6,190	7,170	8,150	8,990	10,100	0.33228	3.28358
US-101	2,460	3,840	4,980	6,390	7,400	8,410	9,270	10,410	0.33094	3.29966
K-Value	0.27047	0.85718	1.20028	1.5283	1.72033	1.888029	2.01644	2.16884		

8. FUTURE CONDITIONS

8.1. WATERSHED URBANIZATION

In the hills, much of the area is open space preserve and protected from development. In the upper valley, by Searsville Lake, there is very light urbanization on mostly rural tracts of land. In the lower valley, Palo Alto and Menlo Park are essentially fully built out.

Given this information, it is not likely that imperviousness, a measure of urbanization, will change considerably in the next fifty or so years.

8.2. SEARSVILLE DAM

8.2.1. EXISTING CONDITION

Currently the dam provides very little storage in the reservoir proper due to sedimentation. However, there is a definite observed attenuation[24] from historical storms and modeling observations seem to indicate two main factors causing attenuation upstream of the lake:

- For the tributaries feeding into Searsville Lake, the channel capacity is very limited. There is significant usage of floodplains by these tributaries once the low flow channel is exceeded.
- Two constrictions from roadway crossings exist that divide the area upstream of the reservoir. The first is Portola Road crossing Alambique Creek. The second is the Stanford Causeway that spurs off Lakeshore Drive, which is a part of the Stanford Jasper Ridge preserve.

The combination of floodplain usage and roadway constrictions creates artificial detention ponds upstream of Searsville Lake, causing the observed attenuation. Map details can be seen in Figure 2.

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[24] Xu, Jack. SCVWD. Technical Memorandum - Effect of Searsville Lake on Large Storm Events. March 25, 2015.

8.2.2. FUTURE CONDITION

Stanford's Searsville Alternatives Study Committee (SASC) was formed in 2011 by the Stanford University Provost to develop a recommended course of action to address the future of Searsville Dam and Reservoir. SASC is comprised of twelve Stanford University administrators, prominent faculty, including specialists in conservation, land use, environmental sustainability, and water conservation. The results of their findings are published in the Searsville Alternatives Study[25].

SASC has identified not exacerbating flood risk as a primary goal of future Searsville operations. Future Searsville operation is uncertain as Stanford is currently in litigation. However, the Searsville Alternatives Study put forth by SASC recommends two options:

- Let the dam silt in and build a fish ladder passage.
- Create an orifice at the dam base and excavate the sediment inside the lake.

To reflect a the possibility of a silted in dam, a hypothetical condition of a filled in dam was analyzed, where the 1% design storm for both the 24-hr and 72-hr was run with a starting water surface at the invert of the lowest gate in the 2D model to simulate a completely full dam. Results were compared to the existing run and there was no difference in peak flow or timing.

As for the second orifice condition, the details of the orifice size and invert are not known at this point. It is known that the opening needs to facilitate fish passage, but also provide attenuation during high flows.

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[25] Searsville Alternatives Study, Steering Committee Recommendations. Stanford University. April 2015.

APPENDIX A

Santa Clara Valley Water District

TECHNICAL MEMORANDUM

PROJECT: San Francisquito Creek – Searsville Lake **DATE**: March 25, 2015

SUBJECT: Effect of Searsville Lake on Large Storm Events

PREPARED: Jack Xu, PE

1. PURPOSE

The purpose of this report is to quantify the causes of attenuation for Searsville Lake and the effects on San Francisquito Creek flows during significant storm events.

2. BACKGROUND

Searsville Dam is owned and operated by Stanford University, and was constructed in 1892, creating Searsville Lake. The watershed upstream of the dam is approximately 14.5 square miles, which accounts for about a third of the total watershed of San Francisquito Creek. A general map can be seen in Figure 1.

The lake experiences severe sedimentation from upstream sources. According to the Searsville Lake Impact Study[1], varying sedimentation rates averaging about 9 acre-feet per year have occurred over the past 100-plus years. This has significantly decreased the amount of storage that the lake can hold. Currently, from field visits and conversations with Stanford and Balance Hydrologics, the dam will spill through manual gates even during a very minor storm event, and experience uncontrolled overtopping soon thereafter.

However, observations from recent large flood events show that heavy runoff routed through Searsville Lake provided a flood benefit for San Francisquito Creek and communities downstream, either by delaying the timing of the peak flow, or by attenuating the peak flow and releasing the volume over a longer period of time. A case study was performed for the 2012 event to detail the benefits of a lake and no lake scenario in this analysis. Benefits vary widely, and subsequent discussion will focus on determining the behavior of the lake.

3. METHODOLOGY

Analysis focused on using measured data where available. Effort was made to interpret the data to evaluate probable explanations for the attenuation. To augment the dataset where there was missing information, a two-dimensional hydraulic model was constructed, since field visits and general knowledge of the area surrounding the Lake revealed that the attenuation effects were too complicated for a simple model. Using multiple historic events, the 2D model was calibrated and verified. Most of the modeling work and calibration was done for the 2015 San Francisquito Hydrology Study[2]. This study is currently in a draft-review phase, but the calibrated 2D model, along with input data, and historical storms, were utilized for this study used to help analyze the effects of Searsville Lake.

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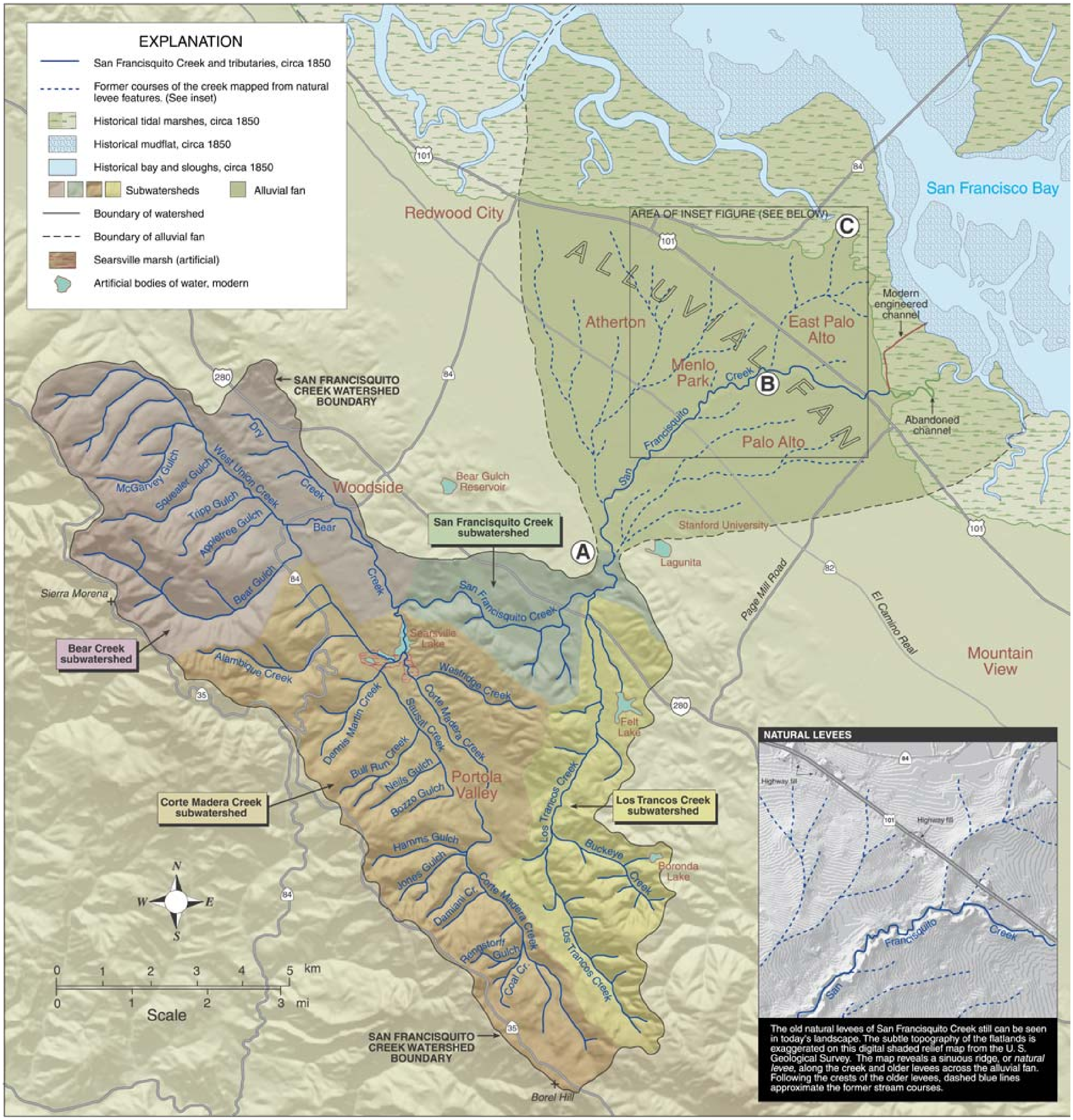
[1] NHC. Balance Hydrologics. HT Harvey & Associates. Jones & Stokes. Kondolf, Matt. Smith, Jerry. Searsville Lake Sediment Impact Study. Stanford University, Facilities Operations. March 2002.

[2] SCVWD. Xu, Jack. San Francisquito Hydrology Study. 2015.



The old natural levees of San Francisquito Creek still can be seen in today's landscape. The subtle topography of the flatlands is exaggerated on this digital shaded relief map from the U. S. Geological Survey. The map reveals a sinuous ridge, or *natural levee*, along the creek and older levees across the alluvial fan. Following the crests of the older levees, dashed blue lines approximate the former stream courses.

Figure 1: San Francisquito Watershed Map

4. HYDROLOGIC DATASET

To analyze the effects of the lake on downstream flows, large historical flow events that had inflow and outflow measurements for Searsville Lake were needed. Upon solicitation, Balance Hydrologics furnished pertinent stream flow data for the events that will be analyzed in this report. However, the data provided was not exhaustive for the events analyzed and missing data was estimated. Several methods were used to fill in the data gaps:

- For the 2011 and 2010 events, only one upstream tributary (Corte Madera Creek) was gaged. These events also had reliable gage adjusted radar rainfall data, and were used in the historical calibrations in the hydrologic model. Therefore, outputs from the HEC-HMS hydrologic model prepared by the 2015 San Francisquito Hydrology Study were used as tributary inflow inputs for the HEC-RAS models.

- For the 2005 event, Corte Madera Gage was the only gaged location as well. However, rainfall data was not reliable. Therefore, the remainders of the tributary inflows were determined by scaling the Corte Madera Creek hydrograph based on drainage area.

- The 2012 event had two gaged tributaries upstream of the Lake. Additionally, a third tributary had visual observations for estimated flow. For the remaining tributaries, flow was determined by scaling the hydrographs from the average of the two gaged tributaries, in the same manner as the 2005 event. However, for the tributary with visual observations, the hydrograph was modified so that the observed flow values properly fit within the rising and receding values of the scaled hydrograph.

- In 1998 and 2000, there were no gaged tributaries upstream of the Lake. Therefore, gage adjusted radar rainfall data was used in the HEC-HMS hydrologic model and the appropriate outflows were used as inputs into the 2D model.

- In 2000, there was no outflow data for Searsville Dam. The 2D model was used to determine the outflow during that time.

Four separate hydrographs were developed based on the different tributary sub-catchments to quantify the 2D model inflow. This was necessary to properly model the attenuation created by different topographic features in the 2D model, such as Portola Road and Family Farm Road.

- Alambique Creek

- Corte Madera Creek

- Dennis Martin & Sausal Creeks

- Additional sub-basin tributary to the Searsville Lake not included in the previous three

5. HYDRAULIC 2D MODEL

HEC-RAS 5.0.0 BETA, released October 2014, will be used to perform the 2D analysis. RAS 5.0 was chosen as the software of choice due to the simplicity of its 2D application, as well as its industry standard use. The October 2014 release is the final BETA release before the final release, and runs very stable with few issues.

A 2D computation mesh was created by using a *.LAS dataset from the 2006 LiDAR survey that generated a digital terrain model with 10' x 10' squares. This dataset was cleaned to remove errant reflectivity data from foliage and buildings by the survey vendor. Relevant hydraulic structures were inputted with data from Balance Hydrology's 1D HEC-RAS model[3] of Searsville that was sent to the District for review in 2014. The outfall of the entire model was modeled as a 2D Boundary Condition Line, which uses a rating curve generated from Balance Hydrology's model. This curve was double checked with recorded stage and flow data from historical events, which was also provided by Balance.

The 2D Boundary Condition Line spans six grid elements, and during simulation, five of those grid elements are wetted. Due to program limitations in the beta, water surface elevations can only be determined on a grid-by-grid basis while in the 2D domain. Conversation with Gary Brunner, lead developer at HEC, revealed that the computational scheme allows for different water surface elevations within each grid at the boundary condition line. Each grid independently uses the rating curve based on its connection at the boundary condition line. Therefore, there are slight variations in the water surface elevations, depending on grid characteristics. The five wetted grids will be average to determine a single water surface elevation, which will be used to determine flow from the rating curve.

Computational point spacing for the mesh was set at 100' x 100' and 50' x 50', depending on the detail required. A sensitivity analysis that ran the same model at a 10' x 10' mesh showed negligible output difference. The diffusive wave computational method was selected over the full dynamic solution due to the lack of potential energy losses through obstructions. A sensitivity analysis using different methods also yielded negligible difference.

To properly characterize the lake, several historical calibrations were run to determine if the model is accurate. When available, stream gage data was used as input into the model. HEC-RAS inputs from other tributaries that were not gaged were estimated, similar to the methods detailed in Section 4. A final manning's roughness coefficient of 0.1 worked well for all the historical storms. Results from the calibration and verification process are further detailed in the San Francisquito Hydrology Study.

The 2D model was the same model used in the 2015 San Francisquito Hydrology Study to characterize the effects of the Lake within the hydrologic HEC-HMS model.

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[3] Sears_US_JPA_052114.prj. Balance Hydrology is Stanford University's consultant.

6. BASELINE OBSERVATIONS

A total of six historical storms were looked at by using the data as described in Section 4. Each storm event was characterized as either being a storm where Searsville Lake had significant attenuation effects (blue), or a storm where the Lake had nuanced attenuation effects (orange). The peak lag time between inflow and outflow, and the overall peak flow reduction, were parameters used to quantify attenuation. Table 1 below documents each storm and the associated attenuation.

Table 1: Historical Lake Attenuation

Historical Event	Peak Inflow (cfs)	Peak Outflow (cfs)	Peak Lag Time (hrs)	Reduced Flow (cfs)	Flow Reduction (%)
2012	2481	1553	3.25	928	37.4%
2011	794	619	3.5	175	22.0%
2010	1429	982	2	447	31.3%
2005	2478	1258	2	1,220	49.2%
2000	1486	1068	1.5	418	28.1%
1998	3023	2588	0.5	435	14.4%

From the table above, there are two events that have parameters that do not necessarily fit the mold. For 2011, there is such a small peak flow reduction, but a large lag time. For 2000, the numbers are very close to the 2010 event. However, it is suspected that the inflow and outflow values for 2000 are less reliable, since there was no gage data for the entire watershed and since all the data was being handled by models.

It is also noted that the attenuation effects of the storm do not seem to follow a trend based on the peak inflow. The 2012 and 2005 events experienced significant attenuations, while the 1998 event experienced very little.

7. ANTECEDENT CONDITIONS

It is well known that the antecedent condition of the watershed can profoundly affect runoff. To analyze this, two datasets were looked at to determine the saturation of the watershed prior to the peak rainfall events for the six storms; antecedent rainfall and baseflow conditions prior to the largest inflow.

For antecedent rainfall, gage adjusted radar rainfall data was looked at one day prior to the peak rainfall intensity for five out of the six events. The 2005 data was extremely suspect and not used. A one day look-back period was used since the gage adjusted radar rainfall data began 24 hours prior to the peak rainfall intensity.

A longer look-back period was not pursued, due to the distance of the nearest rain gage which would provide the data. The nearest rain gage station that was operational during this time frame was at Dahl Ranch. This is a District gage that is on the edge of the entire San Francisquito watershed, just to the east of the Los Trancos Creek tributary area. Due to the observed temporal variation of storms in this area, it was decided not to pursue the use of that gage.

Figure 2 shows a scatter plot of the rainfall percentage that falls during the 24-hr look-back period for the five storm events. Hour zero is the earliest point in time, while hour 23 is the time of highest rainfall intensity. From the plot, the storms in 1998 and 2000 exhibit a higher percentage of rainfall during the earlier hours, while the storms in 2010, 2011, and 2012 have the majority of the rainfall occurring during the immediate hours before the peak rainfall intensity.

Cross referencing the observations from Figure 2 with Table 1, there is a slight trend showing that more attenuation is provided when there is a smaller percentage of antecedent 24-hr rainfall. The 2011 event is an outlier, when looking at peak flow attenuation, but has very large lag time attenuation.

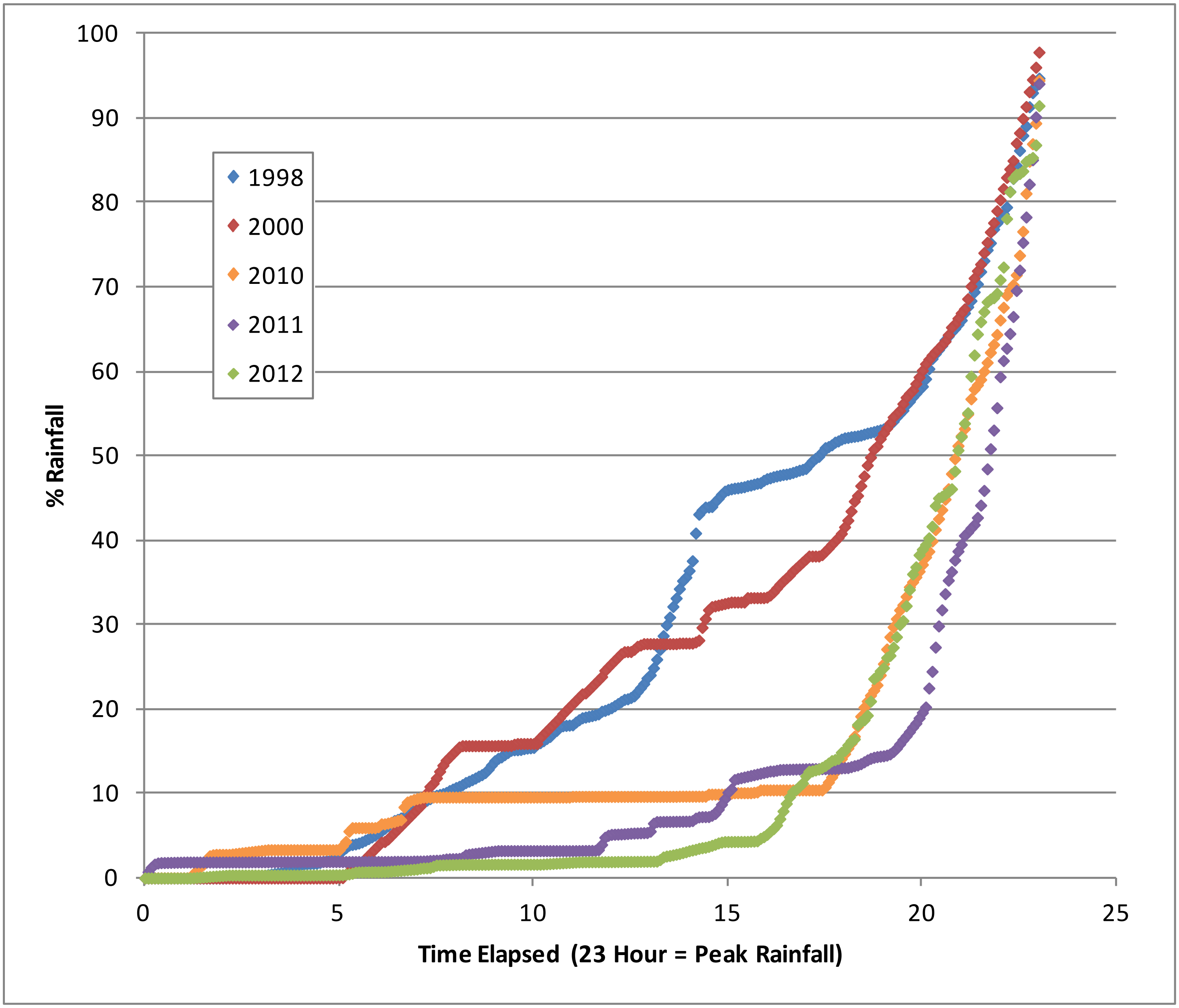

Figure 2: 24-Hr Antecedent Rainfall

The second dataset analyzed was observed baseflow prior to the largest inflow. To determine baseflow, recorded Searsville Lake outflow data was used. The prevailing baseflow was determined to be the lowest flow before the peak hydrograph recorded at Searsville Lake, marked as point B on Figure 3, which was taken from Chow et al[4]. Table 2 summarizes the recorded low flows for five of the six events, as Searsville Lake was not being recorded in 2000. The results suggest that a lower antecedent baseflow produces a larger attenuation. The resulting events are then characterized as having significant attenuation (blue) or nuanced attenuation (orange) based on the antecedent patterns. A graphical representation of the effects of prior low flow to flow reduction is in Figure 4.

Table 2: Prevailing Baseflow

Historical Event	Peak Inflow (cfs)	Peak Outflow (cfs)	Peak Lag Time (hrs)	Flow Reduction (%)	Prior Low Flow (cfs)
2012	2481	1553	3.25	37.4%	30
2011	794	619	3.5	22.0%	65
2010	1429	982	2	31.3%	35
2005	2478	1258	2	49.2%	15
2000	1486	1068	1.5	28.1%	N/A
1998	3023	2588	0.5	14.4%	70

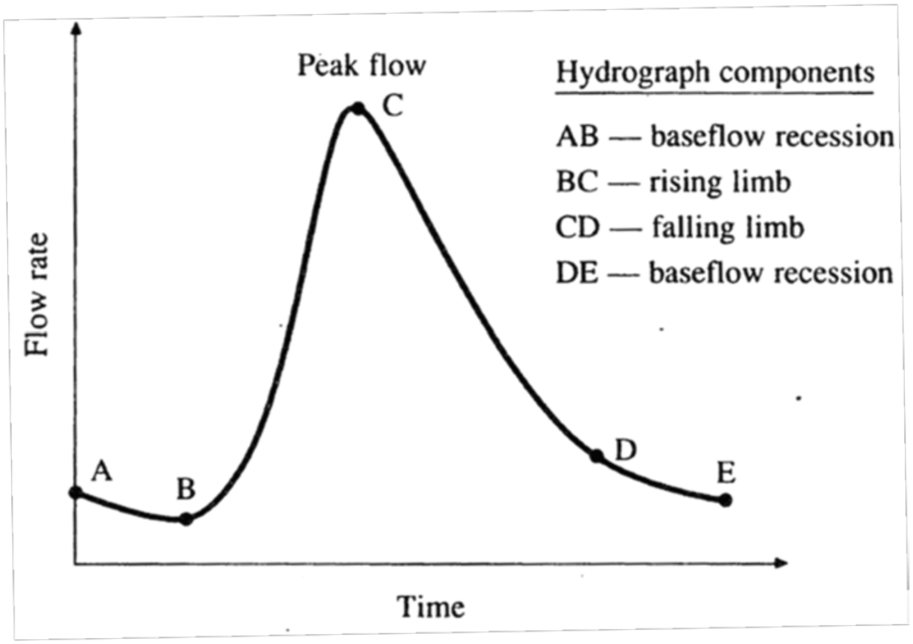

Figure 3: Baseflow Hydrograph Reference

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[4] Chow, Ven Te. Maidment, David R. Mays, Larry W. Applied Hydrology. Published 1988. McGraw-Hill.

8. INFLOW VOLUME

Although a peak flow may help characterize a storm's intensity, an analysis was done to determine the relative inflow volume into the Lake during the rising limb of the hydrograph. The rising limb was used to see the utilization of storage within the Lake in attenuating the peak. Using the inflow data detailed in Section 4, inflow volume was determined for the six hours preceding the peak inflow. Six hours was observed to generally be representative of the rising limb of the hydrograph for these storm events.

The 6-hour total volume during the rising limb was then divided by the observed peak inflow. This ratio helps normalize the volume to the size of the storm, and characterizes the general shape of the inflow hydrograph. A higher ratio of volume/peak would infer a wider hydrograph, while the reverse would be true for a lower ratio. Table 3 summarizes the results from these analyses. In general, the higher volume/peak ratios have less attenuation, while the lower volume/peak ratios exhibit more attenuation. Resulting events are characterized as having significant attenuation (blue) or nuanced attenuation (orange) based the volume/peak ratio. Figure 4 summarizes the effect of 6-hr inflow volume and prior inflow volume to flow reduction.

Table 3: Inflow Volume

Historical Event	Peak Inflow (cfs)	Flow Reduction (%)	6-Hr Inflow Volume (AC-ft)	6-Hr Inflow Volume / Peak Inflow
2012	2481	37.4%	373	15.0%
2011	794	22.0%	204	25.7%
2010	1429	31.3%	246	17.2%
2005	2478	49.2%	381	15.4%
2000	1486	28.1%	439	29.5%
1998	3023	14.4%	638	21.1%

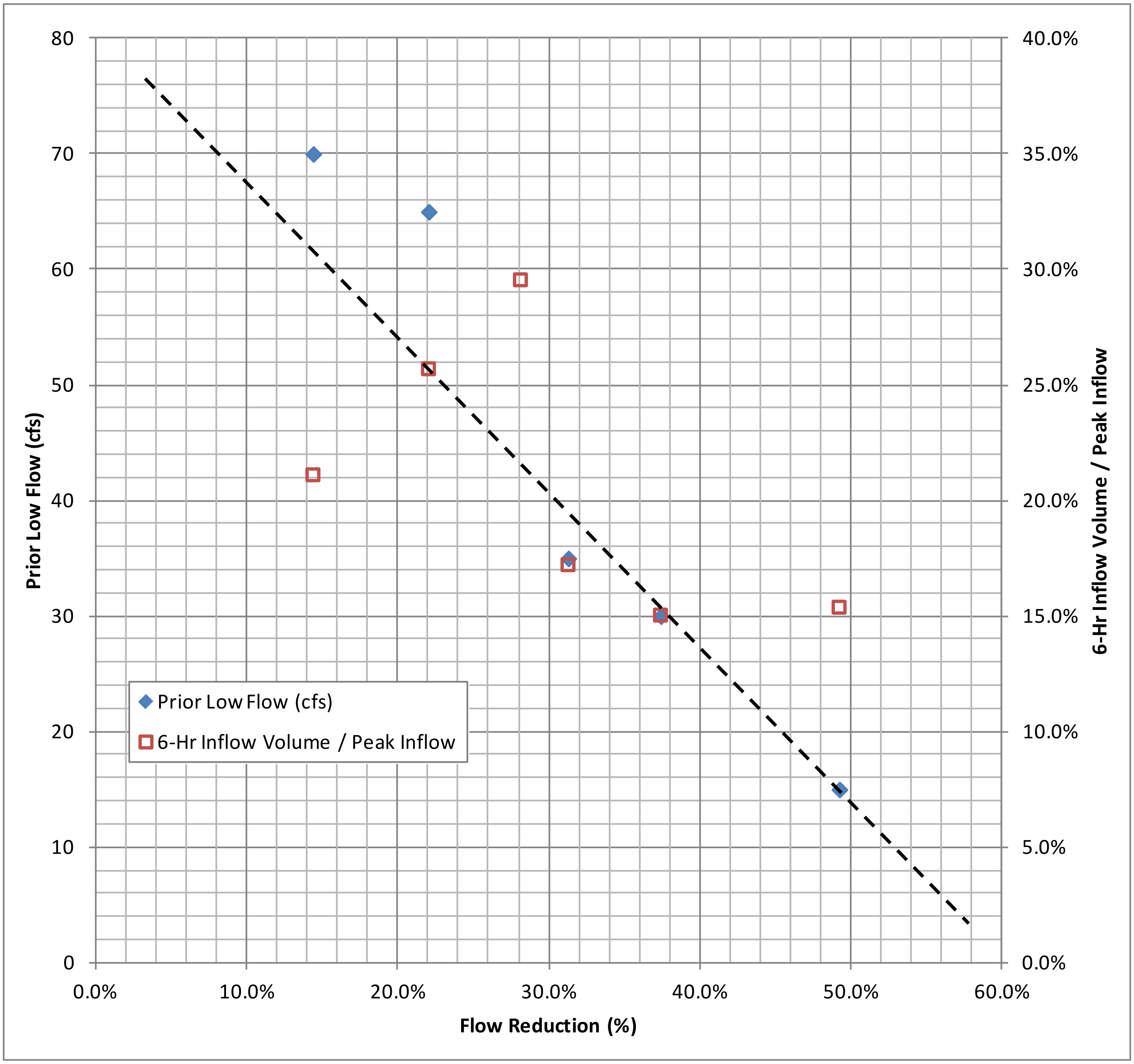

Figure 4: Effects on Flow Reduction

9. DOWNSTREAM EFFECTS

A historical case study was done on the December 2012 event to determine the impacts of Searsville Lake to the downstream reaches of San Francisquito Creek where creek capacity and flooding is an issue. The 2012 event was chosen due to the availability of stream gage data upstream of the Lake to properly estimate the amount of inflow. It is also noted that this event does have one of the highest percentages of flow reduction, and is not representative of every storm event. Due to the high flow reduction, the benefit seen in this case study will likely be on the higher end.

To perform this analysis, the recorded flow downstream will be compared with a hypothetical situation where the lake is not present. No modeling will be performed and measured data will be used. For inflow data into Searsville Lake, the methods outlined in Section 4 was used. Furthermore, two additional stream gages will be used for the study as well. The first is on Bear Creek, and the second is on Los Trancos Creek. Both these creeks join with San Francisquito Creek before entering the valley, as seen in the map in Figure 1. With Searsville, Bear, and Los Trancos, the majority of the runoff producing watershed is accounted for, and additional flows should be negligible for the purposes of this study. To determine the travel time of the flow, analyses will be performed on the recorded data, and the same value will be used for both cases. The USGS gage by the Stanford golf course will be used as the index point to determine impacts to downstream conditions.

For the observed 2012 data, the USGS gage records two peaks, as seen in Figure 5. The first can be attributed to the first Bear Creek peak (4,264cfs), along with smaller flows from Los Trancos and Searsville. Both Bear and Los Trancos peaks occur on the 23rd, at just after 3pm in the afternoon within 15 minutes of each other. This shows that travel times for both Bear and Los Trancos are similar, reaching the USGS gage at 4:30pm, giving a travel time of about 1 hour.

The second and larger peak at the USGS gage occurs at 6:45pm with a flow rate of 5,400cfs. This is attributed, for the most part, to the Searsville Lake spill (1,553cfs) combining with the second Bear Creek peak (3,275cfs). These peaks occur within half an hour, starting at 6pm. The travel time for the Bear and Searsville combined flows is about 45 minutes, slightly faster than the previous travel time. The sum hydrograph of all three of the tributaries is shown in dashed black in Figure 5.

For the hypothetical, no lake scenario, the inflow stream gage data was summed and used as the outflow for Searsville Lake. Travel distance from these stream gages toward the location of the dam was averaged to about 1 mile, which would translate into about a 15 minute travel time at a reasonable velocity of about 6 ft/s, assuming a natural channel in lieu of the lake. Therefore, the summed inflow data was lagged 15 minutes to account for travel time to the dam site. The sum of the three tributaries was then lagged 1 hour to account for the travel time to the USGS gage, which will be considered the hypothetical USGS observed data. Results can be seen in Figure 6.

The estimated peak flow for the no lake scenario is 7,351cfs, which is almost 2,000cfs higher than the observed peak flow value of 5,400cfs. This reduction is a result of a combination of both flow and time attenuation effects from the lake. The largest storm of record on San Francisquito Creek recorded a peak flow of 7,200cfs at the USGS station, which caused significant flooding in the downstream communities in 1998.

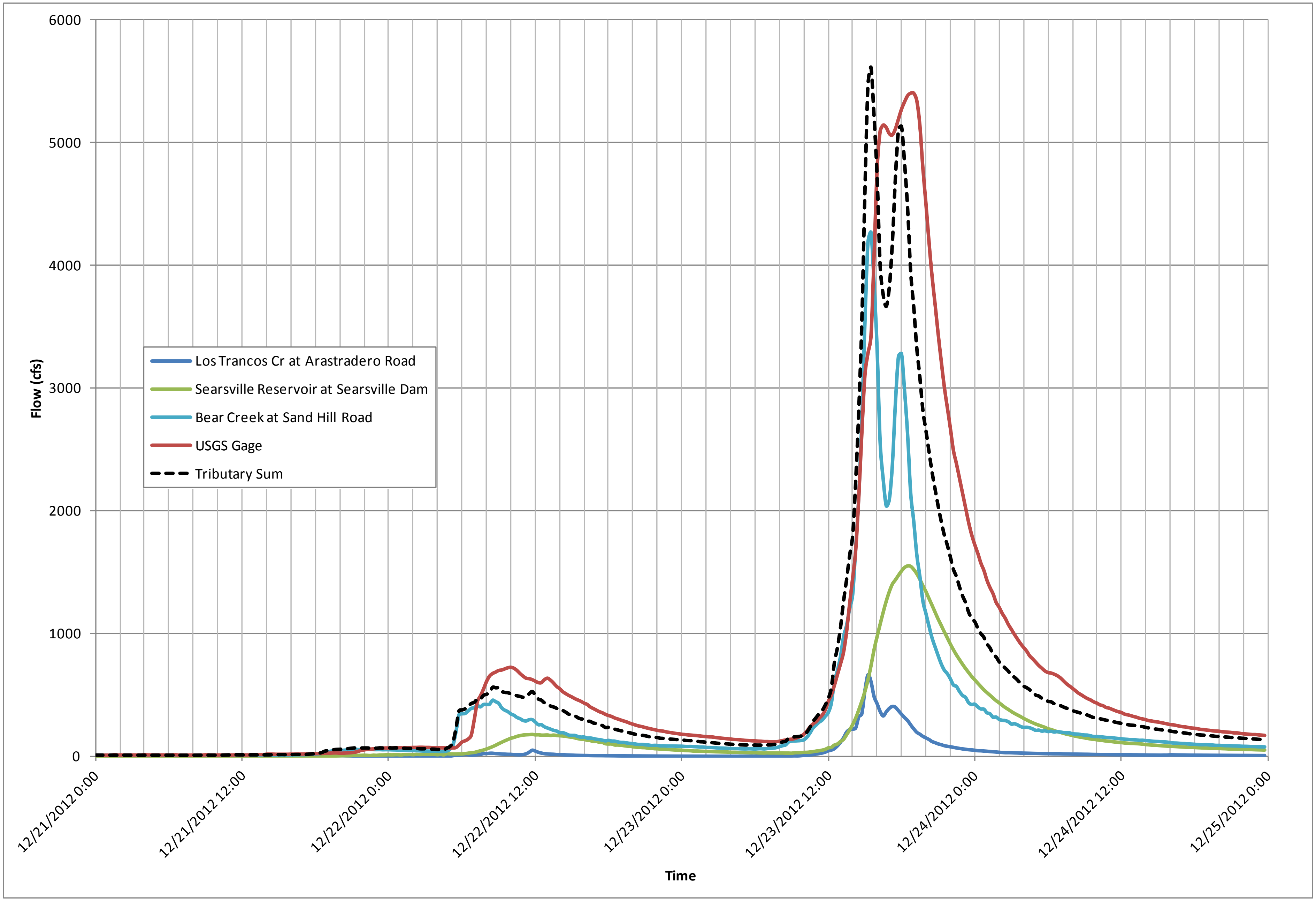

Figure 5: 2012 Observed Stream Flow

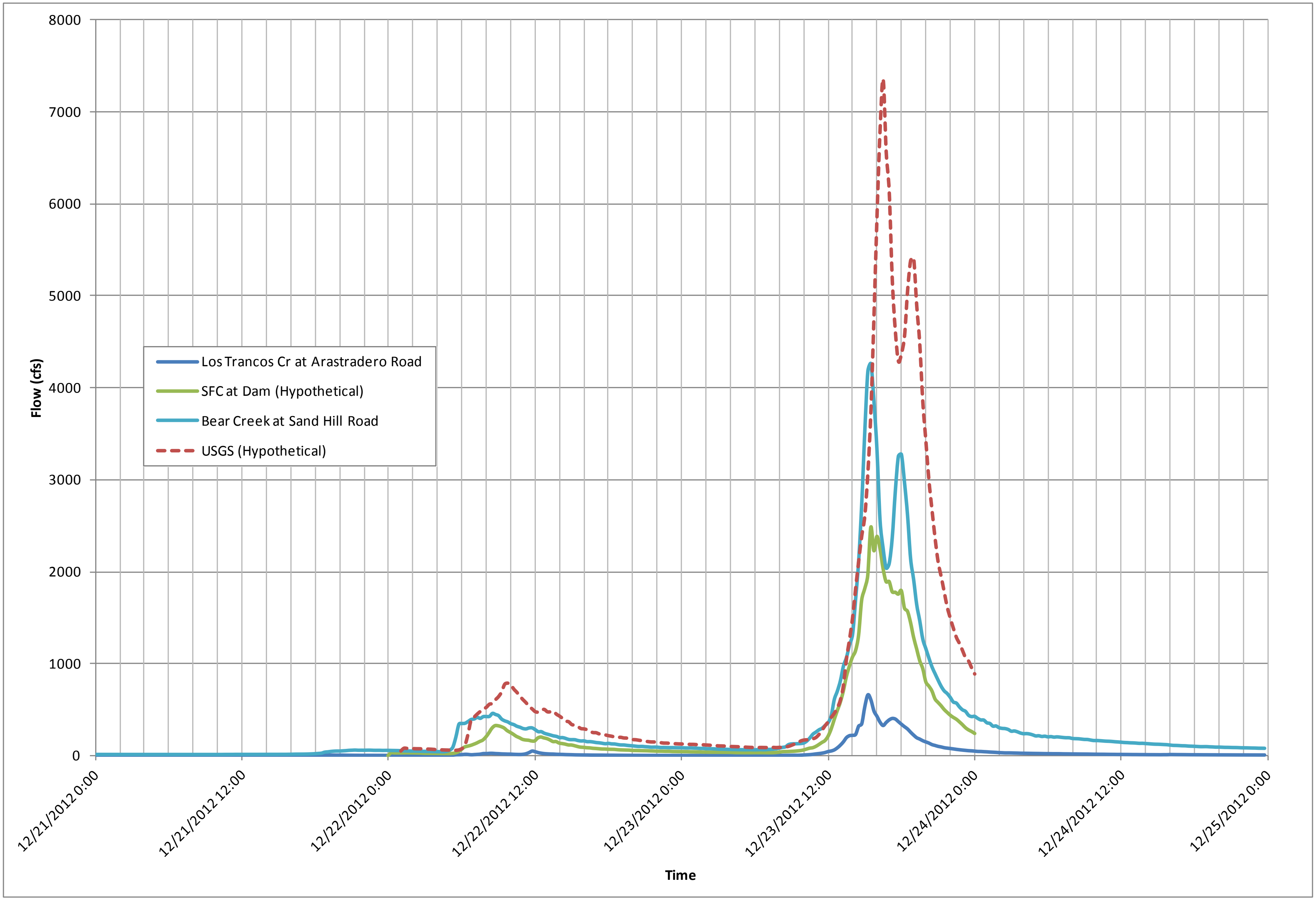

Figure 6: 2012 Hypothetical No Dam Flows

10. CONCLUSIONS

In all six events, three different parameters for each event were then analyzed to quantify the specific characteristics causing the attenuation, including antecedent rainfall, baseflow, and hydrograph shape. General conclusions from the parameters are listed below.

- When the majority (more than 80%-90%) of antecedent rainfall 24-hours before the peak intensity falls within 6 hours of the peak, there is more attenuation.

- When the baseflow prior to the peak inflow is low (less than 30cfs-40cfs), there is more attenuation.

- When the inflow volume / peak inflow is low (less than 18%-20%), meaning a thin and sharp hydrograph, there is more attenuation.

Table 4 below documents how each event performed with respect to all the parameters, and categorizes each event based on the three parameters. Events with significant attenuation are in blue, and events with nuanced attenuation are in orange, with a yes value indicating attenuation.

Table 4: Attenuation Parameter Summary

Historical Event	Flow Reduction (%)	Peak Lag Time (hrs)	24-hr Antecedent Rainfall	Prior Low Flow (cfs)	6-Hr Inflow Volume / Peak Inflow
2012	37.4%	3.25	Y	Y	Y
2011	22.0%	3.5	Y	N	N
2010	31.3%	2	Y	Y	Y
2005	49.2%	2	n/a	Y	Y
2000	28.1%	1.5	N	n/a	N
1998	14.4%	0.5	N	N	N

The results of the analysis show that Searsville Lake has available storage. Storms with the most volume concentrated in the main inflow hydrograph have the most attenuation, while storms that are spread out offer the least attenuation. In addition, the antecedent base flow conditions give a clue to the saturation of the Lake's storage system, showing that an event that occurs during high saturation will not incur much attenuation benefit. The parameters between antecedent rainfall, base flow, and hydrograph shape are likely correlated to some extent, and are probably characteristics of a slow-moving storm system.

The event in 2011 appears to be an outlier, possibly due to the significantly lower peak flow. With a maximum peak inflow to the Lake estimated at around 800cfs, it is almost half the size of the next smallest event.

The exact nature and location of the Searsville Lake storage is not known for certain, but it is hypothesized that the area behind the Lake, identified as the artificial Searsville marsh (Figure 1), is providing the storage. Once the floodplain is utilized, this area has a considerable amount of flow obstructions, as evidenced by a Manning's roughness coefficient of 0.1 in the 2D hydraulic model, and the various culverts used to convey floodwaters under road embankments.

APPENDIX B

DISTRICT'S STATEMENT

CERTIFICATION OF AGENCY TECHNICAL REVIEW
December 2015

Targeted Review

For the:

SAN FRANCISQUITO CREEK HYDROLOGY STUDY
Hydraulics, Hydrology and Geomorphology Unit
DRAFT FINAL USACE DIVISION REVIEW

Prepared by:
Jack Xu, PE Associate Civil Engineer

Under the Direction of:
Liang Xu, Ph. D, PE Engineering Unit Manager

October 2015

San Francisco District

US Army Corps
of Engineers ®

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Subject: Agency Technical Review (ATR) of the **SAN FRANCISQUITO CREEK HYDROLOGY STUDY, Hydraulics, Hydrology and Geomorphology Unit, DRAFT FINAL USACE DIVISION REVIEW, October 2015**, San Francisco District.

Significant concerns and the explanation of the resolution of agency technical review comments for the subject ATR are as follows:

- None

References.

a. ATR guidance: EC 1165-2-214, 15 December 2012, Water Resources Policies and Authorities, CIVIL WORKS REVIEW.
b. The Review Management Organization for this review was the National Flood Risk Management Planning Center of Expertise (FRM-PCX).
c. The ProjnetTM DrChecks Project and Review titles are: Project: (San Francisquito) San Francisquito Creek Flood Risk Management and Review: 2015 Hydrology ATR.
d. The ATR review report is titled: Review Management Organization: National Flood Risk Management Planning Center of Expertise, REVIEW MANAGEMENT ORGANIZATION'S AGENCY TECHNICAL REVIEW REPORT, December 2015, Targeted Review, For the: SAN FRANCISQUITO CREEK HYDROLOGY STUDY, Hydraulics, Hydrology and Geomorphology Unit, DRAFT FINAL USACE DIVISION REVIEW, Prepared by: Jack Xu, PE Associate Civil Engineer, Under the Direction of: Liang Xu, Ph. D, PE Engineering Unit Manager, October 2015, San Francisco District, and contains the ATR Completion Statement.

I certify that all comments resulting from ATR of the subject report have been closed to the satisfaction of the agency technical review team and the project delivery team.

Lyn Gillespie, P.E. Chief, Engineering and Technical Services Division CESPN-ET	Date

Review Management Organization:
National Flood Risk Management
Planning Center of Expertise

REVIEW MANAGEMENT ORGANIZATION'S AGENCY TECHNICAL REVIEW REPORT

December 2015

Targeted Review

For the:

SAN FRANCISQUITO CREEK HYDROLOGY STUDY

Hydraulics, Hydrology and Geomorphology Unit

DRAFT FINAL USACE DIVISION REVIEW

Prepared by:
Jack Xu, PE Associate Civil Engineer

Under the Direction of:
Liang Xu, Ph. D, PE Engineering Unit Manager

October 2015

San Francisco District

US Army Corps
of Engineers ®

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Agency Technical Review Report

Subject: Targeted review of the **SAN FRANCISQUITO CREEK HYDROLOGY STUDY, Hydraulics, Hydrology and Geomorphology Unit, DRAFT FINAL USACE DIVISION REVIEW, October 2015**, San Francisco District.

1. Scope and Purpose of Review. This review report documents a targeted technical review of the subject report and was conducted pursuant to EC 1165-2-214, 15 December 2012, Water Resources Policies and Authorities, CIVIL WORKS REVIEW. The review was conducted for the San Francisco District. The point of contact for the District was Patrick Sing, Project Engineer, CESPN. The ATR team (ATRT) was lead by Marc L. Masnor, CESWF-PEC-PF (Tulsa, OK). The Review Management Organization with responsibility for managing this ATR was the National Flood Risk Management Planning Center of Expertise (FRM-PCX). The review was conducted between October and November 2015.

2. References.

a. This supplement to the review report was prepared in response to EC 1165-2-214, 15 December 2012, Water Resources Policies and Authorities, CIVIL WORKS REVIEW.
b. The review documents reside online at ProjNet^{TM} (www.projnet.org), DrChecks Project and Review titles: Project: (San Francisquito) San Francisquito Creek Flood Risk Management and Review: 2015 Hydrology ATR.

3. Project Description. San Francisquito Creek forms the boundary of the Santa Clara Valley Water District’s (SCVWD) jurisdiction to the north with San Mateo County. The watershed is approximately 45 square miles, with the majority of the watershed in the rural foothills of the San Francisco Peninsula. The Creek’s watershed impacts the cities of Palo Alto, East Palo Alto, and Menlo Park. Stanford University is also a major landowner in the region and owns several reservoirs within the watershed.

San Francisquito has three main tributaries that combine to form the creek proper once it leaves the foothills and enters the urbanized valley. Bear Creek is the northernmost tributary and is unimpaired. To the south, Searsville Lake and Dam collect runoff from Alambique, Dennis Martin, Sausal, and Corte Madera Creeks. Searsville Lake offers some attenuation, but has experienced severe sedimentation over time. On the southeastern edge of the watershed, Los Trancos Creek flows unimpaired, passing Felt Lake, a diversion pond owned by Stanford. All three of these tributaries meet before traveling downstream toward the bay through urbanized neighborhoods.

The purpose of the report was to update the 2007 San Francisquito Hydrology Report by improving the following items from the old report:

- Upgrading the numerical model from HEC-1 to HEC-HMS v4.0.
- Characterizing the routing effects of Searsville Lake and dam by using a 2D hydraulic model.
- Using revised and improved methodology for design storms, loss, and Clark’s hydrograph parameters (Tc & R).
- Calibrating the numerical model to historical storms.
- Performing a flood frequency analysis (FFA) on the USGS stream gage and validating the hydrologic design model to the FFA.

A hydrologic model that reflects the existing San Francisquito Creek watershed was developed. This model will be used to determine revised 1% and 10% design flows for the entire creek.

4. Review Team. The following team members met the requirements of the District and RMO for this targeted review.

ATRT Lead – Marc Masnor P.E., Civil Engineer, CESWF-PEC-PF (Tulsa, OK) – 918-669-7349, Marc.L.Masnor@usace.army.mil. Mr. Masnor is a civil works water resources planner in the Plan Formulation Section of the Southwestern Division Office (SWD) Regional Planning and Environmental Center (RPEC), headquartered in the Fort Worth District Office (CESWF) in Fort Worth, TX. He works from the Tulsa District Office (CESWT) in Tulsa, OK, 1645 S. 101st East Ave, Tulsa, OK 74128-4609. He has 37 years of experience with the Corps of Engineers, Tulsa District, Tulsa, OK.

Marc is a SWD regional technical specialist (RTS) for plan formulation and National Environmental Policy Act evaluation of flood risk management (FRM), ecosystem restoration (ECO), and water management and reallocation studies (WMRS). As a senior plan formulation specialist and regional technical specialist, he assists in the development of unique or complex formulation and analysis techniques within the framework of Corps of Engineers guidance; Federal, state, and local laws and regulations; and stakeholder interests. He has been both study manager and project manager for many Tulsa District planning studies that involved flood risk management, ecosystem restoration, comprehensive watershed studies, water supply, reservoir storage reallocation, navigation, hydropower, and chloride control. Mr. Masnor has worked in hydrology, design, project management, and civil works planning offices within the Tulsa District and has completed a wide variety of water resources studies in Kansas, Oklahoma, and Texas. Studies included the evaluation of navigation and hydropower expansion on the McClellan-Kerr Navigation system; a system of 122 small reservoirs in the Grand-Neosho Basin; chloride control evaluations in the Arkansas and Red River Basins; multiple purpose reservoirs system formulation; storage reallocation studies, regional needs studies; watershed ecosystem restoration evaluations; and several local levee, channel, detention, and buyout plans.

He currently provides support for offices within (a) the RPEC and Districts within SWD, (b) three planning centers of expertise (PCX) review management organizations (RMO) for FRM, ECO, and WMRS, and (c) multiple division office RMOs across the Corps. He has participated in or lead roughly 100 ATRs or DQCs.

(a) He supports the RPEC and the SWD as the plan formulation RTS, as an agency technical review (ATR) team member or team lead for continuing authority projects, as a district quality control (DQC) team member, and as a project delivery team (PDT) member.

(b) He supports three PCX RMOs as the ATR Team lead. In that capacity he selects and manages ATR teams to analyze pre-authorization feasibility studies conducted by Districts related to flood risk management, water management and reallocation, ecosystem restoration, and navigation. He has been the Southwestern Division Regional Manager for the FRM PCX National Manager, Eric Thaut (SPD) since 2008 through 2013. Marc participates in a national team that develops tools in support of the PCX RMOs managing body called the PCX Guild. This small team meets at the direction of the Guild to prepare supplemental review tools such as checklists, templates, and training materials for ATR and PDT teams.

(c) He also supports the Division RMOs as the ATR lead. In that capacity he selects and manages ATR teams to analyze post-authorization implementation studies including design documentation reports (DDR) and detailed project reports (DPR), and plans and specifications (P&S), generally for FRM, ECO, and WMRS.

Hydrology and Hydraulics – David Williams, CESWT – 918-669-7091, David.J.Williams@usace.army.mil. David Williams, Hydraulic Engineer, U.S.

Army Corps of Engineers, Tulsa, OK. Dr. Williams graduated Cum Laude from the University of Tulsa in 1999 with a Bachelor of Arts degree in Geology, from the University of Oklahoma in 2001 with a Master of Environmental Science, from Oklahoma State University in 2004 with a Master of Science in Environmental Engineering, and from Oklahoma State University in 2007 with a Doctor of Philosophy in Civil Engineering. He has worked for the U.S. Army Corps of Engineers for 3 years in the Tulsa District office. He currently serves as a Hydraulic Design Engineer for Tulsa District in the areas of flood modeling, flood control structure design, and climate change. Additionally, he serves as a National Hydraulic Modeling Team Lead for the USACE Modeling, Mapping, and Consequences (MC) Production Center and as a representative on the USACE Climate Change and Water Management PDT. Dr. Williams is a member of the USACE Hydrology Committee and of the USACE Extreme Storm Workgroup. He serves on a National Dam Safety Evaluation Team and has conducted several risk-based analyses in the field of Hydrology and Hydraulics. Current work includes modeling of dam break scenarios on multiple structures nationwide as well as levee certification modeling, all based on risk analysis framework. In addition to his employment with USACE, Dr. Williams is an Adjunct Professor of Civil Engineering at Oklahoma State University and a Research Associate (Geosciences) at the University of Tulsa.

5. Charge to Reviewers. A separate charge document was not developed for this targeted review. The District briefed the reviewer. The ATRT Lead's electronic meeting notice provided the location and description of review documents, review schedule, labor codes, and labor amounts. The notice also identified the District POC and provided contact information, identified the Projnet^{TM} DrChecks project and review, and stated the requirement for four part comments.

6. Summary. The ATR was completed without issues or controversy. The ATRT finding was that the District conducted a thorough peer review. The following paragraphs summarize the status of comments.

a. Critical. None.
b. Unresolved. None.
c. Lessons Learned. None.

7. Dr. Checks Report. The Projnet^{TM} DrChecks report of all comments is attached as Enclosure 1.

8. ATR Completion. Enclosure 2 contains the completion statement of agency technical review. A completion statement for a decision document would be signed by ATRT Lead, the District point of contact, and the RMO representative. Because this was a targeted review the completion statement is only signed by the ATRT Lead and the District point of contact. The District POC should provide a copy of the review report with both signatures for records.

Marc L. Masnor
____
Marc L. Masnor
CESWF-PEC-PF (Tulsa, OK)

Enclosure 1

PROJNET^{TM} DRCHECKS REPORT OF ALL COMMENTS

UNCLASSIFIED\\FOR OFFICIAL USE ONLY

Comment Report: All Comments
Project: San Francisquito Creek Flood Risk Management
Review: 2015 Hydrology ATR
Displaying 4 comments for the criteria specified in this report.

Id	Discipline	Section/Figure	Page Number	Line Number
6284017	Hydrology	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

REVIEW CONCERN

Design rainfall values.

BASIS FOR THE CONCERN

It is stated in the report (page 48) that NOAA Atlas 14 was not used to characterize the design storm as previous studies have yielded high flows. There certainly can be value in developing a site-specific analysis in lieu of using a more generalized study such as NOAA Atlas 14, but the discussion on page 48 describing why NOAA Atlas 14 is inappropriate is limited.

SIGNIFICANCE OF THE CONCERN

Medium

ACTION NEEDED TO RESOLVE THE CONCERN

At a minimum, a more complete explanation about why NOAA Atlas 14 was excluded would be helpful on page 48. For example, how do the design values published in NOAA Atlas 14 compare with the TDS design values? How do these compare with TP-40? What factors make NOAA Atlas 14 unsuitable at this location?

Submitted By: David Williams (918-669-7091). Submitted On: Oct 30 2015

1-0 Evaluation **Concurred**

Additional narrative included in section 5.2 RAINFALL DEPTH. In summary, the depths were larger and the percentage short duration/long duration depths were larger too, resulting in higher runoffs. Comparison between NOAA-14 and District TDS equations shown for all sub-basins on new Table 7. Comparison between NOAA-14 at a point rainfall gauge station (ca. 1966) with District statistical numbers done as well in new Table 8. TP-40 shows approximately 6" for 1%, 24-hr storm, and appears closer to the District TDS equations (attachment). However, the 2" contours are rough and difficult to exact.

Submitted By: Jack Xu (4086302913) Submitted On: Nov 05 2015 (Attachment: TP_40_1p_24hr.jpg)

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: David Williams (918-669-7091) Submitted On: Nov 16 2015
Current Comment Status: **Comment Closed**

6284018	Hydrology	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

REVIEW CONCERN

Use of the TDS regional equation.

BASIS FOR THE CONCERN

Without having a detailed knowledge of heavy precipitation events in this basin, it is assumed that they result from onshore flow and occur in part to the local orographic effect of the coastal range. It is also assumed that excessive precipitation results from specific types of weather patterns, e.g. the "Pineapple Express" or some other prevailing flow that brings relatively warm, moist air onshore. Do the storms that were used in the statistical analysis adequately represent the full range of plausible events?

SIGNIFICANCE OF THE CONCERN

Medium

ACTION NEEDED TO RESOLVE THE CONCERN

Please comment.

Submitted By: David Williams (918-669-7091). Submitted On: Oct 30 2015

1-0 Evaluation **For Information Only**
You are correct - all the major moisture that falls in the SFC watershed, and really most of the state for that matter, are from atmospheric river type events, aka pineapple express. There are sometimes very isolated and small convective storms, but these do not occur on the west side of our region, which is where SFC is located.

Our statistical analyses (which produce our TDS equations) rely on recorded rain gauge data that the District has operated - most of which were installed from 1960 to 1980, with an average record length of 30+ years.

Since all the major rain events are atmospheric rivers, the rain gauge data should reflect that as well.

Submitted By: Jack Xu (4086302913) Submitted On: Nov 04 2015

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: David Williams (918-669-7091) Submitted On: Nov 16 2015
Current Comment Status: **Comment Closed**

6284019 Hydrology n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

REVIEW CONCERN

Adopted design rainfall.

BASIS FOR THE CONCERN

Although the TDS equation and coefficients were provided in the report, the adopted design rainfall values were not. Discussion on page 48 would benefit from a table of values.

SIGNIFICANCE OF THE CONCERN

Medium

ACTION NEEDED TO RESOLVE THE CONCERN

Please consider adding a table of TDS design rainfall values to the report. For the sake of comparison, NOAA Atlas 14 design rainfall values would be helpful as well.

Submitted By: David Williams (918-669-7091). Submitted On: Oct 30 2015

1-0 Evaluation **Concurred**
Included new Table 7 to compare 1% 72-hr and 24-hr TDS depths to NOAA-14 depths.

Submitted By: Jack Xu (4086302913) Submitted On: Nov 05 2015

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: David Williams (918-669-7091) Submitted On: Nov 16 2015
Current Comment Status: **Comment Closed**

6284021 Hydrology n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

REVIEW CONCERN

Available storage in Searsville Lake.

BASIS FOR THE CONCERN

On page 13 of the technical memorandum, it is stated that "the exact nature and location of Searsville Lake not known for certain, but is hypothesized that the area behind the lake, identified as the artificial Searsville marsh, is providing the storage." With respect to storage behind the dam, the most critical volume for the hypothetical runoff events is the volume above the normal pool elevation since the additional runoff will be routed on top of this permanent or semi-permanent pool. Since this is the case, a detailed volume-elevation curve can be developed from the DEM, and the areas providing the most storage can be readily identified.

SIGNIFICANCE OF THE CONCERN

Medium

ACTION NEEDED TO RESOLVE THE CONCERN

Consider additional analysis (using the DEM) that will improve knowledge about available flood storage volume behind Searsville Dam. Historical relationships can be developed from topographic quadrangle maps and/or the original design memorandum from the project (if available).

Submitted By: David Williams (918-669-7091). Submitted On: Oct 30 2015

1-0 Evaluation **Concurred**

Additional analysis performed using the DEM, converting it to a TIN file and using a GIS tool to calculate volume at given elevations. Two storage areas were identified, formed by roadway embankments, and one storage area that includes the lake and the marsh upstream.

Since the technical memo is separate from the hydrology study and is already finalized, the data was not added to the technical memo. The design storm and calibration took into account the storage in the 2D model.

Submitted By: Jack Xu (4086302913) Submitted On: Nov 17 2015

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: David Williams (918-669-7091) Submitted On: Nov 20 2015

Current Comment Status: **Comment Closed**

Enclosure 2

COMPLETION STATEMENT OF AGENCY TECHNICAL REVIEW

COMPLETION OF AGENCY TECHNICAL REVIEW

A targeted agency technical review has been completed for the SAN FRANCISQUITO CREEK HYDROLOGY STUDY, Hydraulics, Hydrology and Geomorphology Unit, DRAFT FINAL USACE DIVISION REVIEW, October 2015, San Francisco District. The review was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-214, 15 December 2012, Water Resources Policies and Authorities, CIVIL WORKS REVIEW. During the review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The DQC process was found to be thorough. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks.

Marc L. Masnor, P.E. Date
ATR Team Leader
CESWF-PEC-PF (Tulsa, OK)

Patrick Sing Date
Project Engineer
CESPN-ET-EW

Targeted reviews are coordinated with the RMO but do not require signature by the RMO representative. A courtesy copy of the review report and signed completion statement should be provided to the RMO.

DISTRICT QUALITY CONTROL CERTIFICATION COMPLETION OF QUALITY CONTROL ACTIVITIES

The District Quality Control (DQC) of the 2015 hydrology study of the San Francisquito Creek watershed has been completed. A hydrologic model of the entire watershed, hydraulic model characterizing the routing effects of Searsville Dam, main report titled "San Francisquito Creek Hydrology Study, Draft Final, USACE Division Review", and supporting reference documents were reviewed. Certification is hereby given that all quality control activities appropriate to the level of risk and complexity inherent in the product have been completed.

GENERAL FINDINGS

Compliance with clearly established policy principles and procedures, utilizing clearly justified and valid assumptions, has been verified. This includes assumptions; methods, procedures and materials used in analyses; alternatives evaluated; the appropriateness of data used and level of data obtained; and the reasonableness of the results. The undersigned recommends certification of the quality control process for this product.

CERTIFICATION

Certification is hereby given that all quality control activities appropriate to the level of risk and complexity inherent with the completed product.

09 October 2015

______________________________ ________________
Janice M. Lera-Chan, P.E. Date
Chief, Water Resources Section
CESPN-ET-EW

______________________________ ________________
Harrison S. Sutcliffe, P.E. Date
Chief, Engineering Branch
CESPN-ET-E

District Quality Control (DQC) Review of the 2015 San Francisquito Hydrologic Study (SCVWD RESPONSE)

Background:

The Water Resources Section of the San Francisco District (SPN) conducted a DQC review of the 2015 hydrologic study of the San Francisquito Creek watershed in September 2015. The 2015 hydrologic study was compiled by the Santa Clara Valley Water District (SCVWD) and includes a HEC-HMS model, a HEC-RAS model, main report, and supporting documentation. SCVWD requests that this hydrologic study be adopted for use in the ongoing San Francisquito Creek General Investigations Feasibility Study. The feasibility study is being conducted by SPN with the San Francisquito Creek Joint Powers Authority (JPA) as the non-federal sponsor. SCVWD is a member of the JPA. A complete list of products included in the 2015 study is presented below.

Products Included in the 2015 Hydrologic Study for DQC Review:

- Main report titled "San Francisquito Creek Hydrology Study, Draft Final USACE DQC Review, September 2015"
- HEC-HMS model "Cal_SFO_2014.hms"
- HEC-RAS model "SearsvilleRAS5.prj"
- Fifteen reference documents for the main report

Prior Coordination Between SCVWD and Water Resources Section:

The Water Resources Section was given the opportunity to review and provide comments on the pre-final draft report in June 2015. At the time of this review, SCVWD had not yet requested a certification of their hydrologic study, so Water Resources Section's review and comments did not constitute an official DQC review. The Water Resources Section initially had comments about SCVWD's assumptions regarding the existing and future operations of Searsville Dam, and had concerns that these operations were not being accounted for in their HEC-HMS model. SCVWD attempted to address these concerns by creating Section 8 ("Future Conditions") in the pre-final draft final report, updating their HEC-HMS model to include a scenario where the lake behind the dam would be full of sediment as a future condition, and by giving a short PowerPoint presentation to Water Resources Section staff regarding the updates to both the pre-final draft report and HEC-HMS model. The Water Resources Section thanks SCVWD for the opportunity to be part of the review process of the 2015 hydrologic study before the official DQC review commenced.

DQC Comments:

Comment #1 (Submitted by: Patrick Sing)

- SCVWD communicated to Water Resources Section that one of the main reasons for conducting this 2015 hydrologic study was to account for attenuation of peak flows caused by the dam at Searsville Lake and that this attenuation was not addressed in SCVWD's 2007 hydrologic study of the San Francisquito Creek watershed. However, the main report does not include much background information of the dam itself. Background information could include (but not necessarily be limited to): original purpose of the dam, construction date of the dam, current capacity of the dam, and sedimentation rates behind the dam. The only background information provided about the dam is in Section 2.5 (page 6) of the main report regarding the square mileage of the watershed that is behind the dam. Because the attenuation of flows caused by the dam was a driving force for conducting the 2015 hydrologic study, it is recommended that additional background information of the dam be included either in Section 2.5 or Section 8.2 of the main report.

SCVWD Response to Comment #1:

- Concur. Requested background information for Searsville Dam is added to the narrative in section 2.5.

Comment #2 (Submitted by: Janice Lera-Chan)

- SCVWD compiled a technical memorandum, dated March 25, 2015, on the effect of Searsville Lake on large storm events. It is mentioned on page 8 of the main report. It is recommended that the memo either be incorporated in the main report or it be included as attachment, rather than just made as a reference. It is also recommended that a plate (i.e. figure map) be added to the main report that focuses on the Searsville Lake area that shows the roads crossings, culvert restrictions and what is referred to as wetlands/small water bodies.

SCVWD Response to Comment #2:

- Concur. The technical memorandum is added as Appendix A, in addition to being a reference. An additional figure/map was added (now Figure 2) detailing the intricacies of the upstream Searsville Lake area, including the wetlands and culvert crossings. It's worth noting that it was very difficult in finding any sort of map that showed the trails and private roads crossing the Jasper Ridge Preserve in Stanford. However, the figure should have all the pertinent information necessary to understand the operation of the upland area.

Comment #3 (Submitted by: Patrick Sing)

- Section 8.2.2 of the main report refers to a "Stanford steering committee". This is in reference to the steering committee commissioned by Stanford University to address the future of the dam at Searsville Lake. To avoid confusion with other steering committees present at Stanford University, the Water Resources Section recommends referring to this committee as the "Searsville Alternatives Study Committee". This is the same title that is used in the recommendation report that was produced by the committee in April 2015 (and is included as a reference to the main report).

SCVWD Response to Comment #3:

- Concur. Steering committee revised to Searsville Alternatives Study Committee (SASC)

Comment #4 (Submitted by: Patrick Sing)

- The Water Resources Section recommends that Section 8.2.2 of the main report be expanded to include further background information on the Searsville Alternatives Study Committee. Background information could include (but not be limited to): reason for why the committee was founded, who participates on the committee, and responsibilities of the committee.

SCVWD Response to Comment #4:

- Concur. Relevant information added to section 8.2.2, with a more clear reference to the Stanford Alternatives Study report.

Comment #5 (Submitted by: Janice Lera-Chan)

- Section 8.2.2 of the main report briefly states that a comparison was made between a scenario where Searsville Lake is filled in with sediment and a scenario where an orifice at the dam base was created and the sediment inside the lake was excavate. How much sediment would be excavated? Recommend a table showing the existing and future discharges and timing for Searsville these scenarios.

SCVWD Response to Comment #5:

- Additional language clarified the sediment filled scenario and the orifice scenario. However, the orifice details are unknown. The steering report does not specify the size, shape, or invert elevation of the "opening". Therefore, we are unable to perform any calculations. Discussion was added explaining this as well in 8.2.2.

Comment #6 (Submitted by: Patrick Sing)

- Section 2.2 of the main report notes that the Curve Number method and Clark's Unit Hydrograph was selected as the loss method and transform method in part because of its successful application to other watersheds within the boundaries of SCVWD. If possible, please provide the names of a couple of these watersheds for comparison of their sizes and shapes to the San Francisquito Creek watershed.

SCVWD Response to Comment #6:

- Added reference to the Lower Peninsula Study (2007) that was also Corps ATR'd, as well as a San Tomas/Saratoga Creek study (2013) that also used Clark's and CN method. Relative basin areas were added too. Basin sizes are within the range of San Francisquito (20-45 sq mi for the other studies). We feel Lower Peninsula Study would be a good comparison watershed since it is adjacent to San Francisquito. However, given the extensive historical calibration performed, any method would have probably been appropriate.

Comment #7 (Submitted by: Patrick Sing)

- Please provide a short explanation in Section 2.4 of the main report about why the Muskingum-Cunge method was selected as the routing method in the HEC-HMS model. Phone communication between SCVWD and Water Resources Section indicates that Muskingum-Cunge was selected because of its application to other SCVWD projects of similar nature to the San Francisquito Creek watershed - if so, the main report should include this information and further elaborate.

SCVWD Response to Comment #7:

- Muskingum-Cunge further explained. Table 19 in HEC-HMS technical reference manual shows it to be the most robust in performing routing. Other District studies that use Muskingum-Cunge are the same as the reports in Comment #6.

Points of Contact:

Name	**Organization**	**Phone**	**Email**
Janice Lera-Chan	SPN-Water Resources Section (Chief)	(415) 503-6743	janice.m.lera-chan@usace.army.mil
Patrick Sing	SPN-Water Resources Section (Hydraulic Engineer)	(415) 503-6950	patrick.f.sing@usace.army.mil
Patrick Howell	SPN-Project Management	(415) 503-6876	patrick.howell3@usace.army.mil
Liang Xu	SCVWD	(408) 630-2780	lxu@valleywater.org
Jack Xu	SCVWD	(408) 630-2913	jxu@valleywater.org

Appendix E

Traffic Analysis

Final Project Report

Traffic Analysis for the Upstream of Highway 101, San Francisquito Creek Flood Reduction, Ecosystem Restoration and Recreation Project

San Francisquito Creek Joint Powers Authority

October 31, 2018

TJKM

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Appendix A – Traffic Counts

Appendix B – Existing Conditions Synchro Reports

Appendix C – Existing Plus Bridge Closure Conditions Synchro Reports

Appendix D – Mitigation Measures Synchro Reports

PROJECT OVERVIEW

ICF requested for professional services for Traffic Analysis for San Francisquito Creek Flood Protection, Ecosystem Restoration and Recreational Project Environmental Document. As part of the project, TJKM evaluated the Pope Street/Chaucer Street Bridge and surrounding intersections for existing and bridge closure conditions during weekday a.m. and p.m. peak periods. The objective of the evaluation is to determine impact of the temporary bridge closure within the study area.

Eight study intersections were selected for the project within the study area. The intersections were evaluated under the study scenarios for the weekday a.m. and p.m. peak periods. This report summarizes the results of the analysis including level of service (LOS), delay and 95th percentile queue lengths at all study intersections.

STUDY INTERSECTIONS

The study intersections selected for the project are listed below and illustrated in **Figure 1**.

1. Willow Road/Gilbert Avenue (Signalized)[1]
2. Willow Road/Middlefield Road (Signalized)[1]
3. Middlefield Road/Woodland Avenue-Palo Alto Avenue (Two-Way Stop Control)[1]
4. Middlefield Road/Palo Alto Avenue (One-Way Stop Control)
5. Pope Street/Central Avenue (Yield Control)[1]
6. Pope Street/Woodland Avenue (All-Way Stop Control)[1]
7. Chaucer Street/Palo Alto Avenue (Two-Way Stop Control)
8. Chaucer Street/University Avenue (Signalized)
9. Woodland Avenue/University Avenue (Signalized)

Note:
[1]Intersections fall within the City of Menlo Park jurisdiction. All other intersections fall under City of Palo Alto Jurisdiction.

PROJECT SCENARIOS

The scenarios selected for the study are listed below:

1. Existing Conditions (2018)
2. Existing plus Bridge Closure Conditions

Existing Conditions (2018)

This scenario evaluates all study intersections with existing lane geometry, traffic controls and traffic volumes.

Existing plus Project Conditions

This scenario evaluates all study intersections with existing lane geometry and traffic controls. All inbound and outbound movements at the bridge along Pope Street/Chaucer Street between Pope Street/Woodland Avenue and Chaucer Street/Palo Alto Avenue are restricted to evaluate bridge closure conditions. This includes the eastbound through, northbound right-turn and southbound left-turn movements at Pope Street/Woodland Avenue and the westbound through, northbound left-turn and southbound right-turn movements at Chaucer Street/Palo Alto Avenue intersections. Based on the study area and existing traffic patterns, traffic volumes for the restricted movements were rerouted.

Mitigation Measures

This scenario evaluates potential mitigation measures to reduce impact on traffic operations during bridge closure conditions.

Project Study Area

Legend

Ⓧ Study Intersections

N

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STUDY METHODOLOGY

LEVEL OF SERVICE (LOS) ANALYSIS METHODOLOGY

LOS is a standard measure of traffic service along a roadway or at an intersection. It ranges from A to F, with LOS A being best and LOS F being worst. In very general terms, LOS A, B, and C indicate conditions where traffic can move relatively freely. LOS D describes conditions where delay is more noticeable and average travel speeds are more unstable. LOS E indicates significant delays and average travel speeds vary greatly and are unpredictable; traffic volumes are generally at, or close to, capacity. Finally, LOS F characterizes traffic flow at very slow speeds (stop-and-go) and significant delays with queuing at unsignalized intersections, which typically means traffic demand on the roadway exceeds the roadway's capacity.

The *Highway Capacity Manual (HCM), 2000 Edition* is the standard reference published by the Transportation Research Board, and contains the specific criteria and methods to be used in assessing LOS. There are several software packages that have been developed to implement HCM. In this study, Synchro Software was used to calculate the LOS at the study intersections.

Signalized intersection LOS and unsignalized all-way stop controlled LOS is based on the capacity of the intersection as a whole and average delay experienced by a driver. Unsignalized one-way and two-way stop controlled intersection LOS is defined by the average delay experienced by a driver for the minor approach worst movement or major approach critical movement. **Table 1** provides the relationship between LOS rating and delay for signalized and unsignalized intersections.

Table 1: Level of Service Thresholds Based on Intersection Delay

Level of Service	***Signalized Intersection Delay (sec)***	***Unsignalized Intersection Delay (sec)***
A	0 ≤ D ≤ 10	0 ≤ D ≤ 10
B	10 < D ≤ 20	10 < D ≤ 15
C	20 < D ≤ 35	15 < D ≤ 25
D	35 < D ≤ 55	25 < D ≤ 35
E	55 < D ≤ 80	35 < D ≤ 50
F	80 < D	50 < D

Source: Highway Capacity Manual (HCM), 2000 Edition

SIGNIFICANT IMPACT CRITERIA/LEVEL OF SERVICE STANDARDS

City of Palo Alto:

The acceptable LOS in the City of Palo Alto is to maintain a "D" or better for non-Congestion Management Program (CMP) Agency intersections and LOS E for CMP intersections. Based on the City of East Palo Alto 1999 General Plan, the acceptable LOS is also LOS D.

For facilities with an LOS E or LOS F under existing, background, or cumulative conditions before the addition of project traffic, a project is said to have a significant impact per CEQA Guidelines Section 15130 if the TIA shows that the project will cause LOS to deteriorate by the following amounts:

- Addition of the project increases the average control delay for critical movements by four (4) seconds or more, or
- Project traffic increases the Critical V/C (Volume/Capacity) value by 0.01 or more

City of Menlo Park:

Per Policy Circ-3.4 of the City of Menlo Park General Plan adopted in November 2016, the City strives to maintain level of service (LOS) D at all City-controlled signalized intersections during peak hours, except at the intersection of Ravenswood Avenue and Middlefield Road and at intersections along Willow Road from Middlefield Road to US 101.

EXISTING CONDITIONS

ROADWAY NETWORK

The existing Pope-Chaucer Bride is a 40-feet wide, two-lane bridge that connects Woodland Avenue and Palo Alto Avenue along Pope Street/Chaucer Street over the San Francisquito Creek. Surrounding land-uses near the bridge are primarily single-family residential homes with a few small businesses on Gilbert Avenue and Menalto Avenue. Key roadways within the project vicinity are described below:

University Avenue is two lane arterial street that connects from El Camino Real in the south to US 101 in the north.

Middlefield Road is a two to four lane arterial streets that connects from Willow Road in the west and University Avenue in the east within the project vicinity.

Woodland Avenue is primarily a two lane local street that connects from University Avenue to Middlefield Road.

Chaucer Street is a two lane local street that connects from Hamilton Avenue in the east to Woodland Avenue in the west.

Pope Street is a two lane local street that connects from Woodland Avenue in the east to Walnut Street in the west.

Palo Alto Avenue is a two lane local street that connects from University Avenue in the north to Middlefield Road in the south.

Gilbert Avenue a two lane collector street that connects from Willow Road in the west to Menalto Avenue in the east.

Willow Road is primarily a two lane arterial that connects from US 101 in the north to Middlefield Road in the south within the project vicinity.

Figure 2 illustrates the existing lane geometry and traffic controls at the study intersections.

DATA COLLECTION

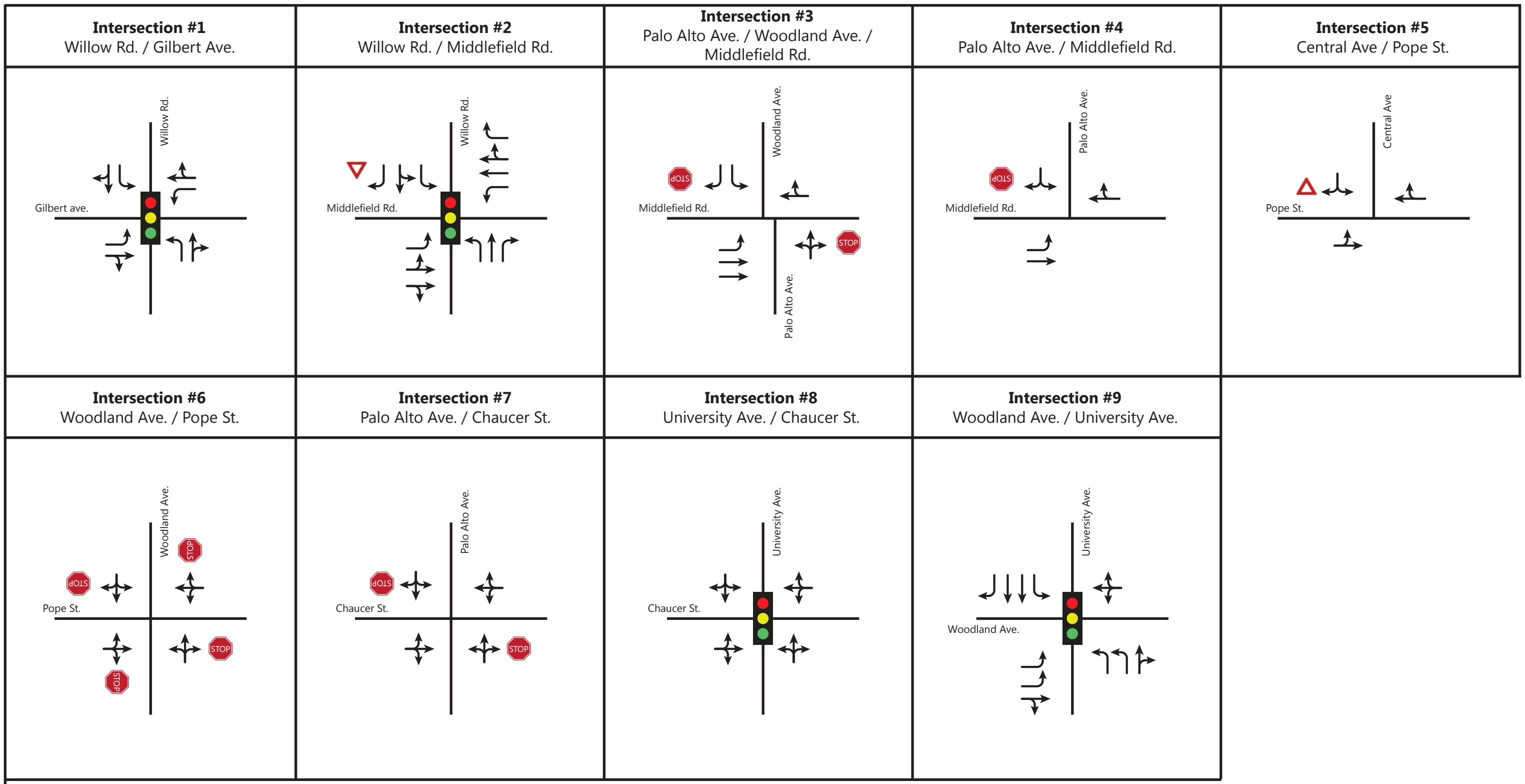
Intersection Turning Movement Counts (TMC)

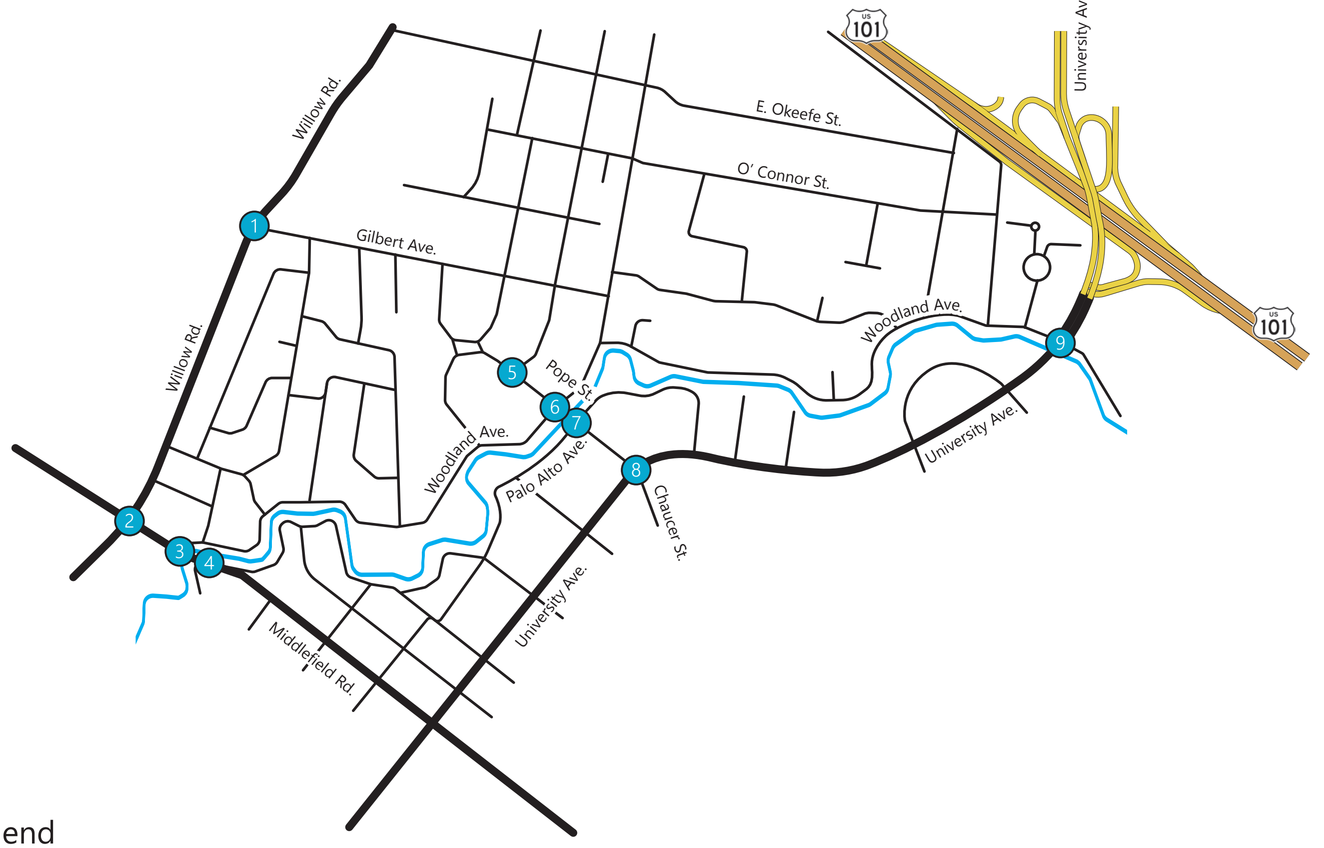
TJKM collected turning movement counts at the study intersections for vehicles, pedestrians, and bicycles on Tuesday, May 22, 2018 on a typical weekday when the schools were in session. The turning movement counts were collected for weekday a.m. (7:00 a.m. - 9:00 a.m.) and p.m. (4:00 p.m. – 6:00 p.m.) peak periods. TJKM obtained Year 2016 turning movement counts for the intersection of Woodland Avenue/University Avenue from the *Newell Bridge Replacement Project Report* dated September 21, 2016. The traffic volumes were projected for existing year 2018 per the report and utilized in this study. **Figure 3** illustrates existing vehicular traffic volumes and **Figure 4** illustrates pedestrian and bicycle volumes for all study intersections. **Appendix A** contains the vehicle, pedestrian, and bicycle counts for the study intersections.

Existing Signal Timing

TJKM obtained the existing traffic signal timing sheets and phasing diagrams for the University Avenue/Chaucer Avenue, Willow Road/Gilbert Avenue, Willow Road/Middlefield Road intersections from the City of Palo Alto and the City of Menlo Park for the purpose of this analysis.

Existing Lane Geometry and Traffic Control





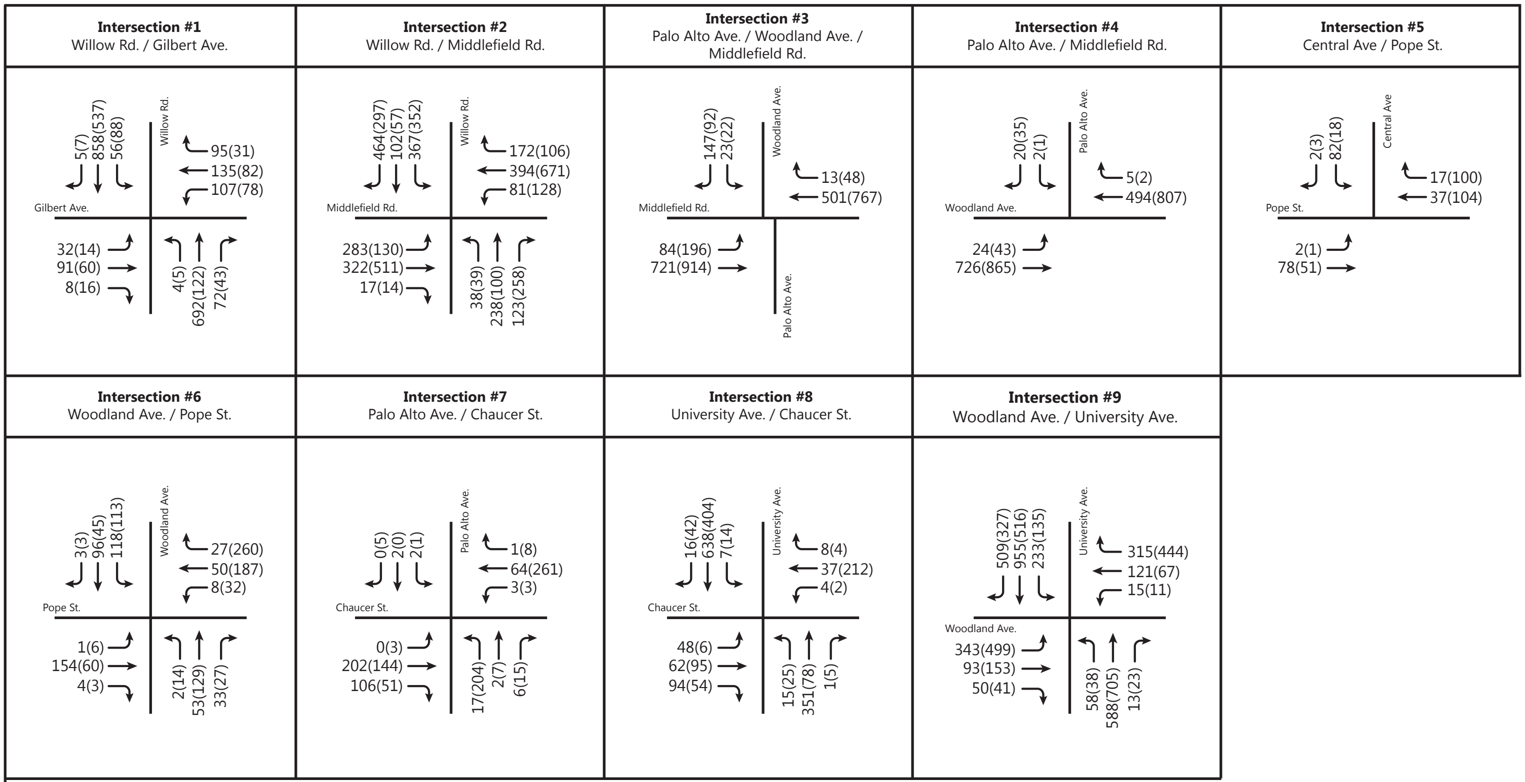
Legend

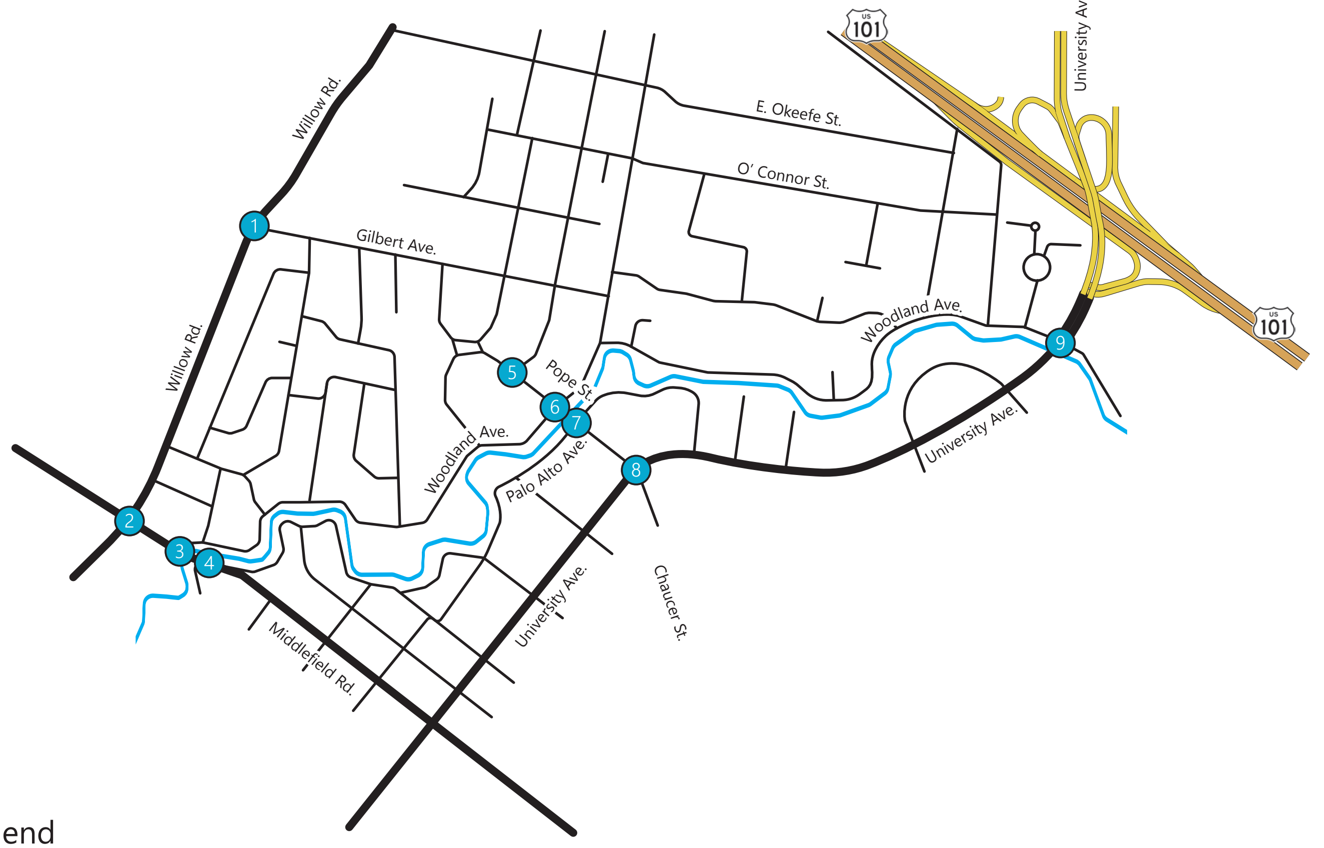
X	Study Intersections
XX	AM Peak Hour Volumes
(XX)	PM Peak Hour Volumes

N

Figure 2

Existing (2018) Traffic Volumes





Legend

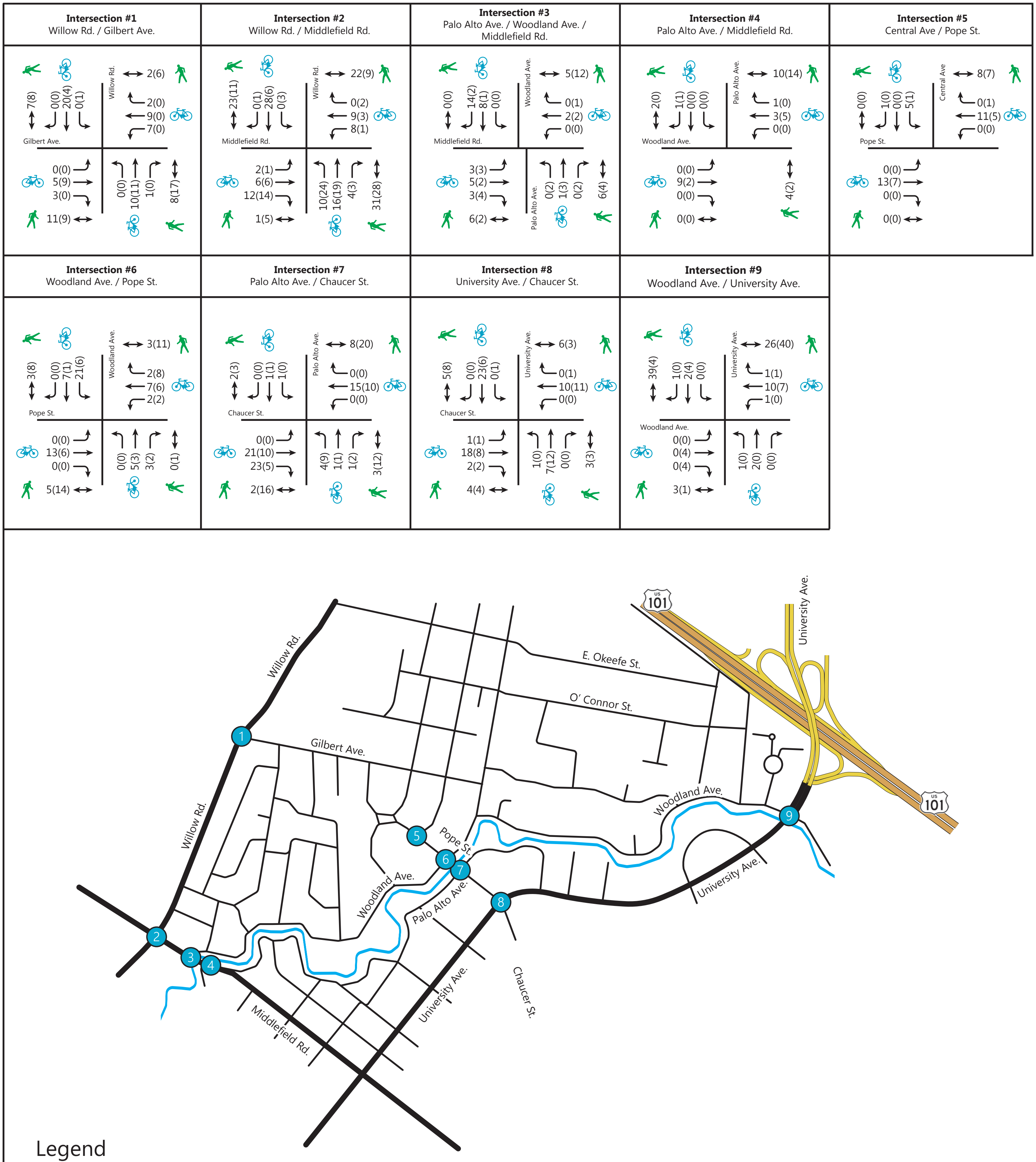
X	Study Intersections
XX	AM Peak Hour Volumes
(XX)	PM Peak Hour Volumes

N

TJKM

Figure 3

Existing (2018) Pedestrian and Bicycle Volumes



Legend

Ⓧ Study Intersections

XX AM Peak Hour Volumes

(XX) PM Peak Hour Volumes

TJKM

Figure 4

EXISTING CONDITIONS (2018) LOS AND 95TH PERCENTILE QUEUE LENGTH ANALYSIS

The existing conditions (2018) scenario evaluates all study intersections with existing lane geometry, traffic controls and traffic volumes. The results of the LOS, delay and 95th percentile queue length in feet (ft.) analysis using Synchro software are summarized in **Tables 2** and **3** respectively. **Appendix B** contains Synchro reports for all study intersections.

Under the existing conditions (2018) scenario, all study intersections operate within applicable jurisdictional standards of the City of Palo Alto (LOS D or better) and the City of Menlo Park during the a.m. and p.m. peak hours with the exception of the following:

- Middlefield Road/Woodland Avenue-Palo Alto Avenue – LOS F during p.m. peak hour

Table 2: Existing Conditions LOS and Delay

#	*Study Intersections*	*Control*	*Peak Hour*	*Existing Conditions*	
				Average Delay[1] (sec)	*LOS*
1	Willow Road/Gilbert Avenue	Signalized	AM	29.4	C
			PM	15.1	B
2	Willow Road/Middlefield Road	Signalized	AM	59.7	E
			PM	52.3	D
3	Middlefield Road/Woodland Avenue-Palo Alto Avenue	Two-Way Stop	AM	17.8	C
			PM	**71.5**	**F**
4	Middlefield Road/Palo Alto Avenue	One-Way Stop	AM	12.3	B
			PM	18.4	C
5	Pope Street/Central Avenue	Yield	AM	10.0	A
			PM	10.1	B
6	Pope Street/Woodland Avenue	All-Way Stop	AM	9.4	A
			PM	16.6	C
7	Chaucer Street/Palo Alto Avenue	Two-Way Stop	AM	11.9	B
			PM	26.1	D
8	Chaucer Street/University Avenue	Signalized	AM	10.4	B
			PM	10.3	B
9	Woodland Avenue/University Avenue	Signalized	AM	39.0	D
			PM	39.3	D

Note:

[1] Delay: Overall intersection delay in seconds per vehicle for signalized and unsignalized all-way stop controlled intersections. Delay for minor approach worst movement or major approach critical movements at unsignalized one-way and two-way stop controlled intersections.

Bold indicates unacceptable LOS.

Existing conditions queue length analysis showed several intersections having 95th percentile queue length exceeding existing storage capacity. **Table 5** summarizes 95th percentile queue lengths at the study intersections.

Table 3: Existing Conditions 95th Percentile Queue Lengths (ft.)

#	***Study Intersection***	***Lane Group***	***Storage Length per lane (feet)***	***Existing Conditions***	
				A.M.	***P.M.***
1	Willow Road/Gilbert Avenue	EBL	55	**#90**	29
		EBTR	400	147	93
		WBL	90	**#188**	**113**
		WBTR	320	**#333**	137
		NBL	75	m3	3
		NBTR	450	363	44
		SBL	90	31	33
		SBTR	455	**497**	207
2	Willow Road/Middlefield Road	EBL	270	**#346**	210
		EBTR	1025	304	420
		WBL	120	133	**182**
		WBT	330	303	**484**
		WBR	65	175	**80**
		NBL	75	69	**80**
		NBT	1010	#360	172
		NBR	110	101	48
		SBL	150	**m307**	**330**
		SBL	250	**m315**	**331**
		SBR	65	**408**	**309**
3	Middlefield Road/Palo Alto Avenue-Woodland Avenue	EBL	50	7	34
		EBT	350	0	0
		EBT	350	0	0
		WBTR	415	0	0
		SBL	30	11	**75**
		SBR	810	33	52
4	Middlefield Road/Palo Alto Avenue	EBL	40	2	5
		EBT	505	0	0
		WBTR	655	0	0
		SBLR	630	4	14
5	Pope Street/Central Avenue	EBLT	245	0	0
		WBTR	300	0	0
		SBLR	665	10	4
6[1]	Woodland Avenue/Pope Street-Chaucer Street	EBLTR	310	60	53
		WBLTR	110	58	**124**
		NBLTR	595	45	71
		SBLTR	500	76	68

#	**Study Intersection**	**Lane Group**	**Storage Length per lane (feet)**	**Existing Conditions**	
				A.M.	**P.M.**
7	Palo Alto Avenue/Chaucer Street	EBLTR	110	0	0
		WBLTR	470	0	0
		NBLTR	510	3	104
		SBLTR	950	2	1
8	Chaucer Street/University Avenue	EBLTR	470	165	88
		WBLTR	530	46	129
		NBLTR	505	147	46
		SBLTR	365	338	208
9	Woodland Avenue/University Avenue	EBL	580	#162	#235
		EBTR	580	126	178
		WBLTR	500	#442	#419
		NBL	160	68	53
		NBTR	536	231	283
		SBL	210	192	134
		SBT	443	326	167
		SBR	443	66	55

Note:

- 95th percentile volume exceeds capacity, queue maybe longer. Queue shown is maximum after two cycles.

m – Volume for 95th percentile queue is metered by upstream signal.

[1]Synchro does not provide queue lengths for all-way stop control intersections. Queues were obtained from SimTraffic.

Bold indicates 95th Percentile Queue Lengths higher than existing capacity.

EXISTING PLUS BRIDGE CLOSURE CONDITIONS

VEHICULAR LOS, DELAY AND 95TH PERCENTILE QUEUE LENGTH ANALYSIS

The existing plus project conditions scenario evaluates all study intersections with existing lane geometry and traffic controls. All inbound and outbound movements at the bridge along Pope Street/Chaucer Street between Pope Street/Woodland Avenue and Chaucer Street/Palo Alto Avenue are restricted to evaluate bridge closure conditions. This includes restriction of the eastbound through, northbound right-turn and southbound left-turn movements at Pope Street/Woodland Avenue and the westbound through, northbound left-turn and southbound right-turn movements at Chaucer Street/Palo Alto Avenue intersections. Based on the study area and existing traffic patterns, traffic volumes for the restricted movements were rerouted. **Figure 5** illustrates the rerouted trips under bridge closure conditions and **Figure 6** illustrates the total traffic demands under the bridge closure conditions.
Existing signal timings were maintained for signalized intersections under this scenario similar to existing conditions. The results of the LOS, delay and 95th percentile queue length in feet (ft.) analysis using Synchro software are summarized in **Tables 4** and **5** respectively. **Appendix C** contains Synchro reports for all study intersections.

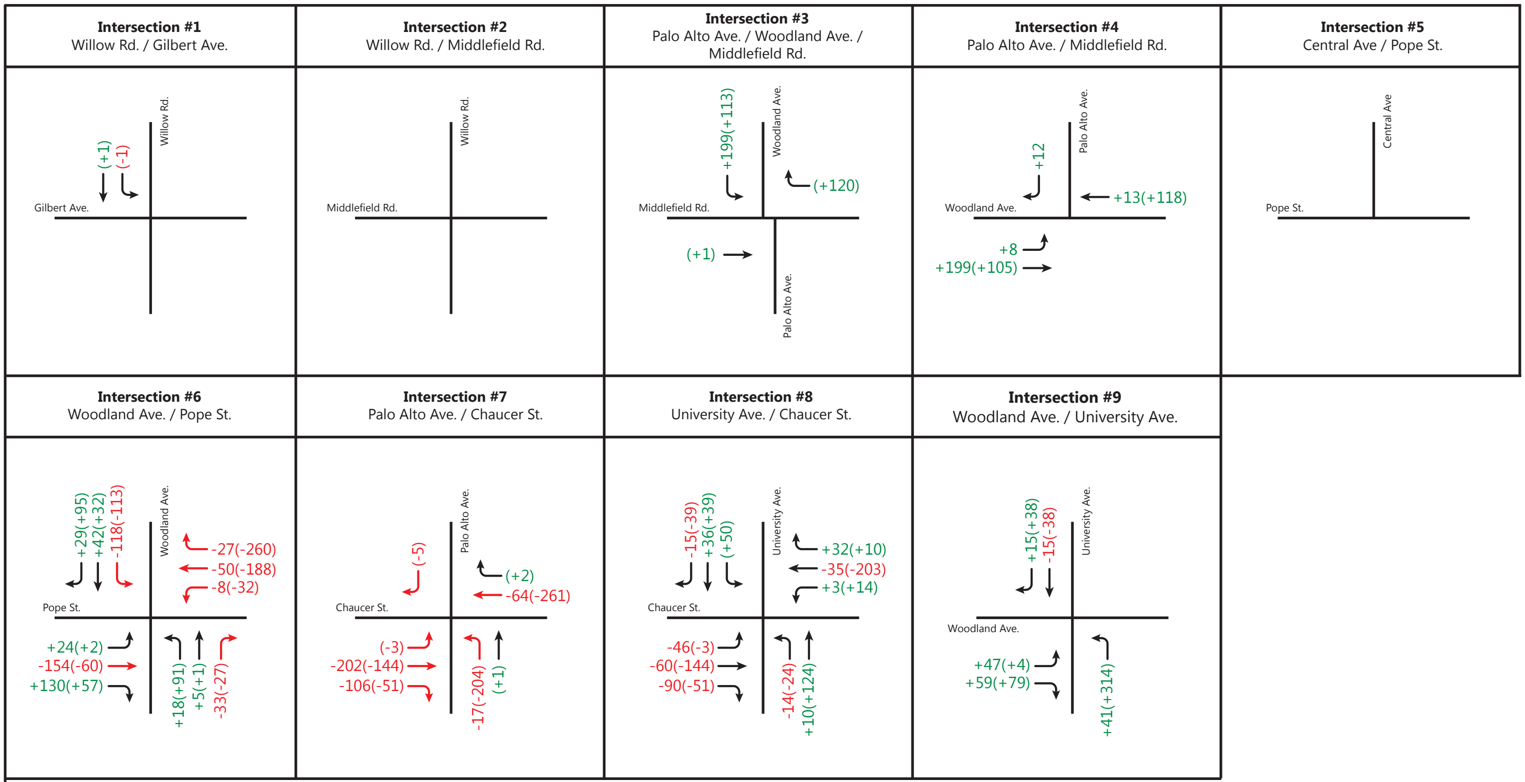
It should be noted that for the purpose of rerouting trips and maintaining reasonable volume balancing at the intersections, all intersections were evaluated with volumes for the same peak hour. The a.m. and p.m. peak hours based on the traffic counts collected are 7:45 a.m. to 8:45 a.m. and 5:00 p.m. to 6:00 p.m. respectively.

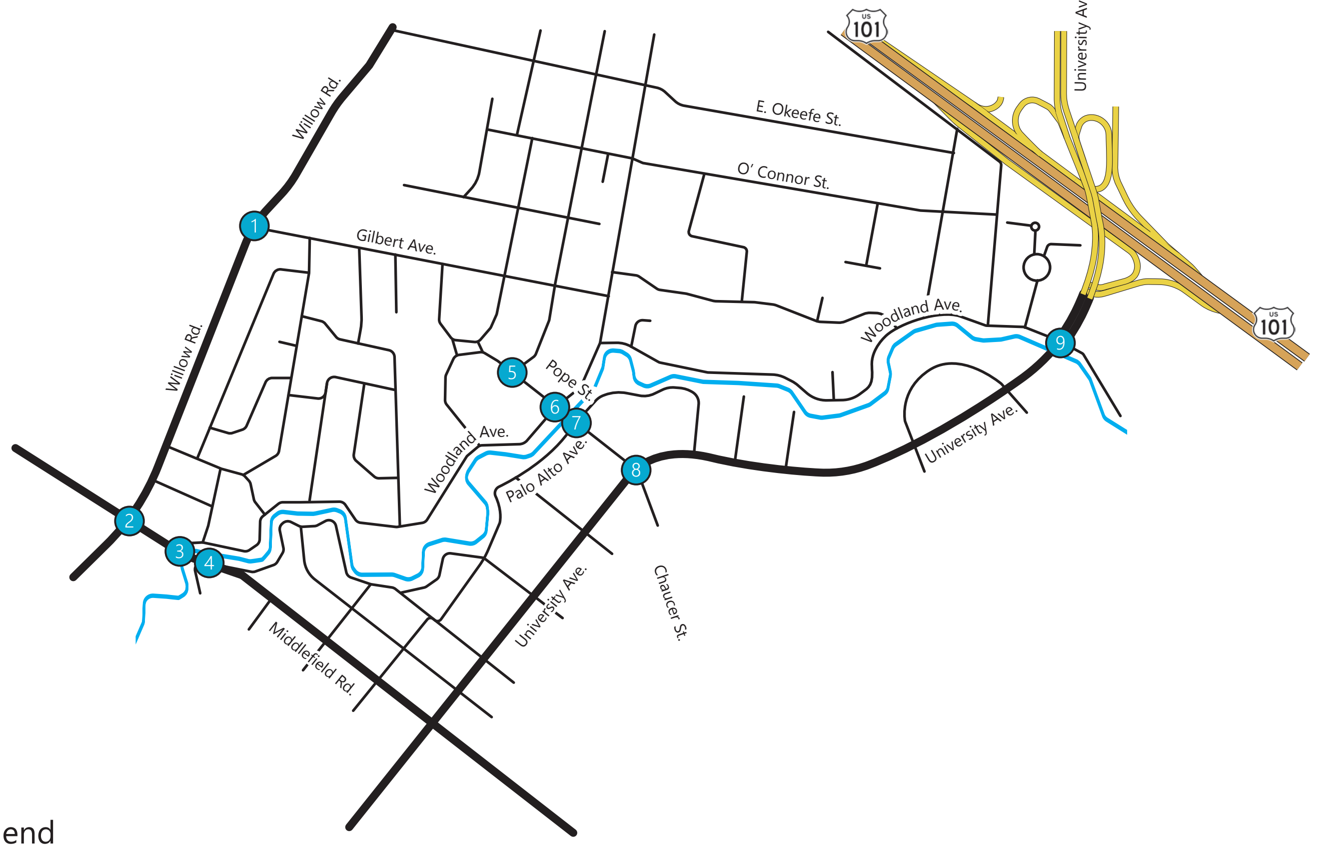
Under the existing plus bridge closure conditions scenario, all study intersections operate within applicable jurisdictional standards of the City of Palo Alto (LOS D or better) and City of Menlo Park during the a.m. and p.m. peak hours with the exception of the following:

- Middlefield Road/Woodland Avenue-Palo Alto Avenue – LOS F during a.m. and p.m. peak hours

Middlefield Road/Woodland Avenue-Palo Alto Avenue intersection operates at LOS F during the temporary bridge closure versus LOS C under existing conditions during the a.m. peak period. During the p.m. peak period, this intersection operates at LOS F, however, the delay experienced by Woodland Avenue approach is substantially higher.

Rerouted Trips During Bridge Closure





Legend

Ⓧ Study Intersections

XX AM Peak Hour Volumes

(XX) PM Peak Hour Volumes

+XX Increase in Trip Volume

-XX Decrease in Trip Volume

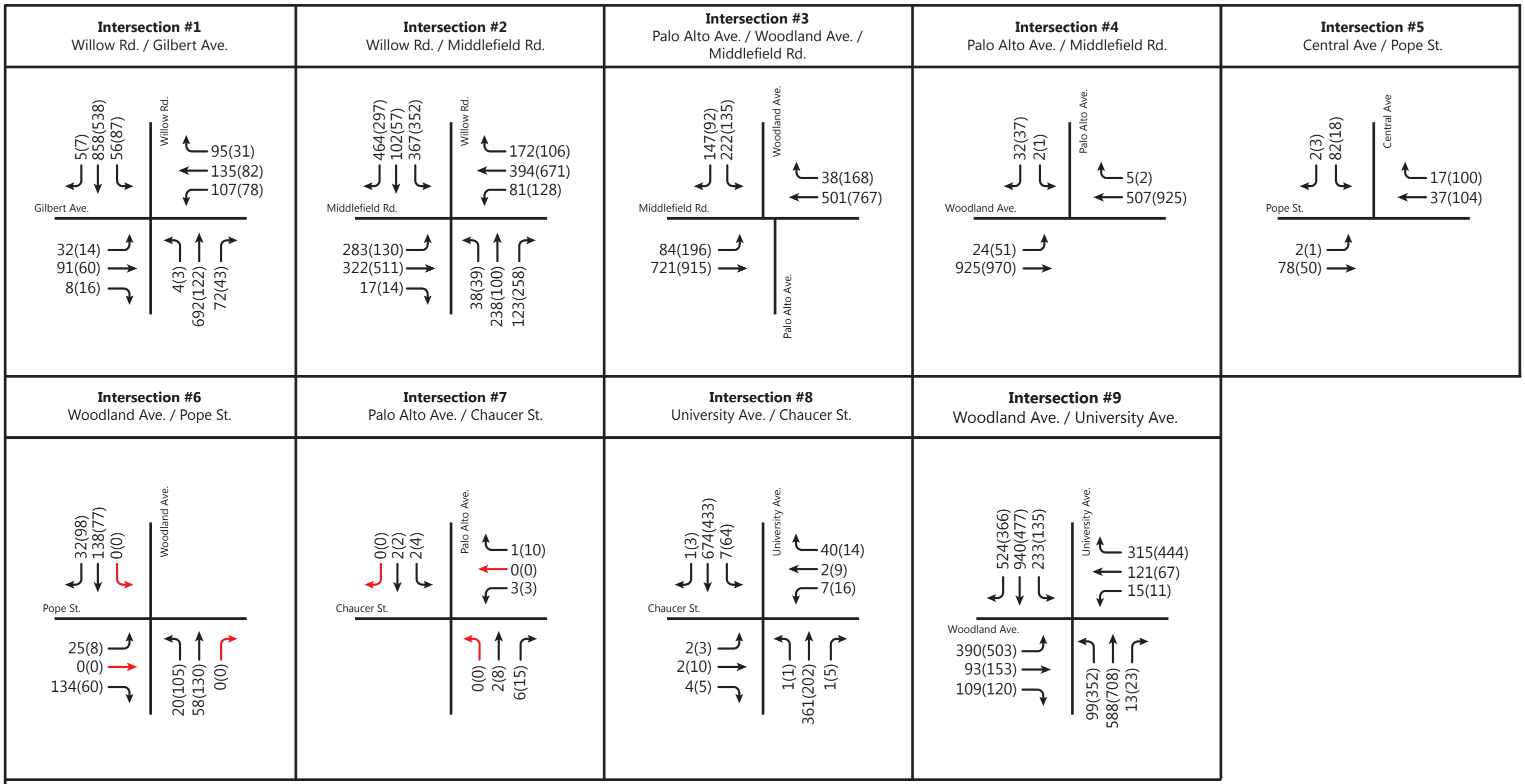
↰ ↑ ↱ Indicates Restricted Movement

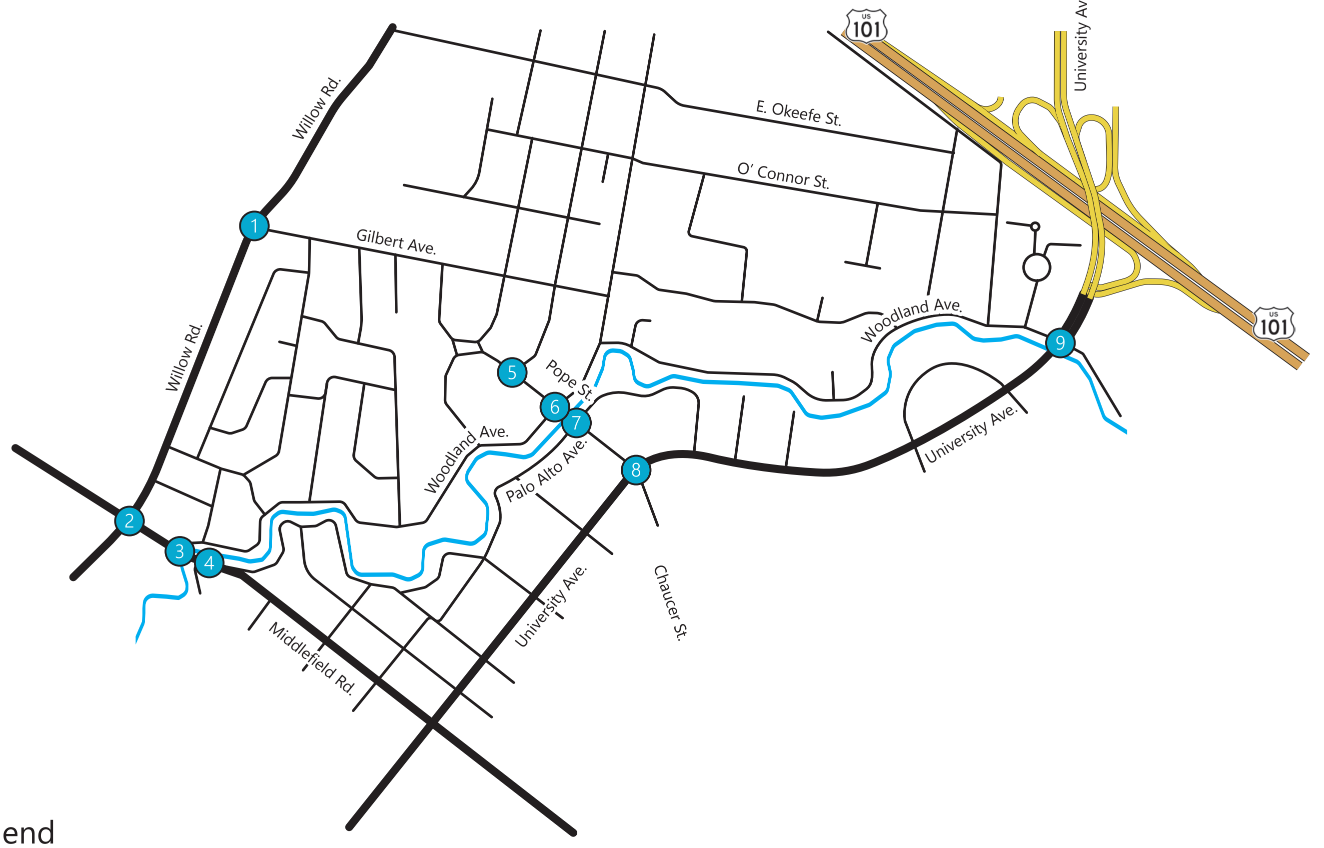
N

TJKM

Figure 5

Existing plus Bridge Closure Conditions Traffic Volumes





Legend

X Study Intersections

XX AM Peak Hour Volumes

(XX) PM Peak Hour Volumes

↰ ↑ ↱ Indicates Restricted Movement

Figure 6

Table 4: Existing plus Project Conditions LOS and Delay

#	Study Intersections	Control	Peak Hour	Existing Conditions		Existing + Bridge Closure Conditions	
				Average Delay[1] (sec)	LOS	Average Delay[1] (sec)	LOS
1	Willow Road/Gilbert Avenue	Signalized	AM	29.4	C	29.4	C
			PM	15.1	B	15.1	B
2	Willow Road/Middlefield Road	Signalized	AM	59.7	E	59.7	E
			PM	52.3	D	52.4	D
3	Middlefield Road/Woodland Avenue-Palo Alto Avenue	Two-Way Stop	AM	17.8	C	**227.4**	**F**
			PM	**71.5**	**F**	**Err[2]**	**F**
4	Middlefield Road/Palo Alto Avenue	One-Way Stop	AM	12.3	B	12.7	B
			PM	18.4	C	21.8	C
5	Pope Street/Central Avenue	Yield	AM	10	A	10.0	A
			PM	10.1	B	10.1	B
6	Pope Street/Woodland Avenue	All-Way Stop	AM	9.4	A	8.3	A
			PM	16.6	C	9.3	A
7	Chaucer Street/Palo Alto Avenue	Two-Way Stop	AM	11.9	B	9.0	A
			PM	26.1	D	9.4	A
8	Chaucer Street/University Avenue	Signalized	AM	10.4	B	4.3	A
			PM	10.3	B	4.8	A
9	Woodland Avenue/University Avenue	Signalized	AM	39.0	D	41.5	D
			PM	39.3	D	51.9	D

Notes:

[1] Delay: Overall intersection delay in seconds per vehicle for signalized and unsignalized all-way stop controlled intersections. Delay for minor approach worst movement or major approach critical movements at unsignalized one-way and two-way stop controlled intersections.

[2] Err indicates error in calculating delay as the volume greatly exceeds capacity.

Bold indicates unacceptable LOS.

The results of the existing plus project conditions queue length analysis was similar to existing conditions analysis at most movements and locations. The queue lengths increased at some locations because of the rerouted trips within the project area, especially at Middlefield Road/Woodland Avenue-Palo Alto Avenue intersection for the Woodland Avenue approach.

Table 5: Existing Plus Bridge Closure Conditions 95th Percentile Queue Lengths (ft.)

#	*Study Intersection*	*Lane Group*	*Storage Length per lane (feet)*	*Existing Conditions*		*Existing + Bridge Closure Conditions*	
				A.M.	*P.M.*	*A.M.*	*P.M.*
1	Willow Road/Gilbert Avenue	EBL	55	#90	29	#90	29
		EBTR	400	147	93	147	93
		WBL	90	#188	113	#188	113
		WBTR	320	#333	137	#333	137
		NBL	75	m3	3	m3	3
		NBTR	450	363	44	363	44
		SBL	90	31	33	31	32
		SBTR	455	497	207	497	207
2	Willow Road/Middlefield Road	EBL	270	#346	210	#346	210
		EBTR	1025	304	420	304	420
		WBL	120	133	182	133	182
		WBT	330	303	484	303	484
		WBR	65	175	80	175	80
		NBL	75	69	80	69	80
		NBT	1010	#360	172	#360	172
		NBR	110	101	48	101	48
		SBL	150	m307	330	m307	332
		SBL	250	m315	331	m315	331
		SBR	65	408	309	408	309
3	Middlefield Road/Palo Alto Avenue-Woodland Avenue	EBL	50	7	34	7	40
		EBT	350	0	0	0	0
		EBT	350	0	0	0	0
		WBTR	415	0	0	0	0
		SBL	30	11	75	**327**	**Err**[2]
		SBR	810	33	52	34	61
4	Middlefield Road/Palo Alto Avenue	EBL	40	2	5	2	7
		EBT	505	0	0	0	0
		WBTR	655	0	0	0	0
		SBLR	630	4	14	6	19
5	Pope Street/Central Avenue	EBLT	245	0	0	0	0
		WBTR	300	0	0	0	0
		SBLR	665	10	4	10	4
6	Woodland Avenue/Pope Street-Chaucer Street	EBLTR	310	60	53	59	47
		WBLTR	110	58	124	0	0
		NBLTR	595	45	71	43	74
		SBLTR	500	76	68	67	73

#	Study Intersection	Lane Group	Storage Length per lane (feet)	Existing Conditions		Existing + Bridge Closure Conditions	
				A.M.	P.M.	A.M.	P.M.
7	Palo Alto Avenue/Chaucer Street	EBLTR	110	0	0	0	0
		WBLTR	470	0	0	0	0
		NBLTR	510	3	104	1	2
		SBLTR	950	2	1	1	1
8	Chaucer Street/University Avenue	EBLTR	470	165	88	14	20
		WBLTR	530	46	129	24	31
		NBLTR	505	147	46	70	80
		SBLTR	365	338	208	174	237
9	Woodland Avenue/University Avenue	EBL	580	#162	#235	#195	#238
		EBTR	580	126	178	#194	#285
		WBLTR	500	#442	#419	#442	#419
		NBL	160	68	53	103	#431
		NBTR	536	231	283	231	284
		SBL	210	192	134	192	134
		SBT	443	326	167	329	178
		SBR	443	66	55	71	71

Notes:

- 95th percentile volume exceeds capacity, queue maybe longer. Queue shown is maximum after two cycles.

m – Volume for 95th percentile queue is metered by upstream signal.

[1] Synchro does not provide queue lengths for all-way stop control intersections. Queues were obtained from SimTraffic.

[2] Err indicates error in calculating delay as the volume greatly exceeds capacity.

Bold indicates 95th Percentile Queue Lengths higher than existing capacity.

PEDESTRIAN AND BICYCLE IMPACTS

With full closure of the Pope St-Chaucer Street Bridge, pedestrians and bicyclists currently using the bridge would experience significant impacts with no alternate routes available within the immediate vicinity of the bridge. Under existing conditions, approximately 13 and 6 bicyclists and 5 and 14 pedestrians cross the bridge in the eastbound direction during the a.m. and p.m. peak hours respectively. Similarly, approximately 15 and 10 bicyclists and 8 and 20 pedestrians cross the bridge in the westbound direction during the a.m. and p.m. peak hours. The intersections of Woodland Avenue/Middlefield Road and Woodland Avenue/University Drive are the closest alternative routes, which are at approximately 0.6 to 0.8 mile distance from the intersection of Woodland Avenue/Pope Street and 0.6 to 0.7 mile distance from the intersection of Palo Alto Avenue/Chaucer Street.

Additionally, there are two bus stops located within close proximity of the bridge, Woodland Avenue & Woodland Court for Routes 83 and 88 and University Avenue & Chaucer Street for Routes 280, 281, 296 and 397. Pedestrians and bicyclists using transit would experience higher delays with the closure of the bridge if they were crossing the bridge to reach their preferred bus stop.

Alternate solutions to mitigate impact faced by pedestrians and bicyclists could include construction staging or constructing temporary pedestrian and bicycle access over the San Francisquito Creek.

MITIGATION MEASURES

Based on the LOS and delay analyses conducted at the eight study intersections, it was observed that under existing year (2018) conditions, all intersections operate with acceptable levels of service during the weekday a.m. and p.m. peak periods with the exception of Middlefield Road/Woodland Avenue-Palo Alto Avenue, which operates at LOS F during the p.m. peak period.

Under existing plus bridge closure conditions, Middlefield Road/Woodland Avenue-Palo Alto Avenue operates at LOS F with significantly higher delay because of the rerouted trips during both a.m. and p.m. peak periods. The 95th percentile queue length analysis conducted provided the same results.

Potential mitigation measures to alleviate the delay experienced at during the bridge closure could include the following:

1. Providing detour signs to divert traffic onto Willow Road rather than Woodland Avenue to get on to Middlefield Road. This would reduce the delay experienced at the intersection because of rerouted trips during commute hours.
2. Providing temporary traffic signal at Middlefield Road/Woodland Avenue-Palo Alto Avenue enabling the intersection to operate with acceptable LOS standards.

TJKM evaluated both options to ascertain the impact on LOS and delay at the study intersections. Under Option 1, traffic that was rerouted to Woodland Avenue/Middlefield Road was rerouted to Willow Road/Gilbert Avenue and traffic signal timings were modified to accommodate the additional traffic. Option 2 does not see any rerouting of traffic; however, traffic signal timings were modified. **Tables 6** and **7** summarize the LOS and delay and 95th percentile queue lengths respectively of the two mitigation measures. **Appendix D** contains the Synchro and SimTraffic analysis reports.

Based on the analysis conducted for the two options, the intersection of Woodland Avenue/Middlefield Road still operates with unacceptable LOS E and F during the a.m. and p.m. peak hours respectively, however, with significantly lower delay under Option 1 scenario. This intersection operates at acceptable LOS for the a.m. and p.m. peak hours under the Option 2 scenario, however, with higher queue lengths for the westbound direction during the p.m. peak period.

Table 6: Mitigation Measures LOS and Delay

#	Study Intersections	Control	Peak Hour	Existing Conditions		Existing + Bridge Closure Conditions		Mitigation Measures-Option 1		Mitigation Measures-Option 2	
				Average Delay (sec)	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
1	Willow Road/Gilbert Avenue	Signalized	AM	29.4	C	29.4	C	32.7	C	29.5	C
			PM	15.1	B	15.1	B	19.5	B	15.1	B
2	Willow Road/Middlefield Road	Signalized	AM	**59.7**	**E**	**59.7**	**E**	**58.6**	**E**	**56.2**	**E**
			PM	52.3	D	52.4	D	54.6	D	52.4	D
3	Middlefield Road/Woodland Avenue-Palo Alto Avenue	Two-Way Stop	AM	17.8	C	**227.4**	**F**	**41.1**	**E**	16.5	B
			PM	**71.5**	**F**	**Err**[2]	**F**	**942.4**	**F**	35.9	D
4	Middlefield Road/Palo Alto Avenue	One-Way Stop	AM	12.3	B	12.7	B	12.7	B	12.8	B
			PM	18.4	C	21.8	C	21.8	C	21.8	C
5	Pope Street/Central Avenue	Yield	AM	10	A	10.0	A	9.0	A	10.0	A
			PM	10.1	B	10.1	B	9.3	A	10.1	B
6	Pope Street/Woodland Avenue	All-Way Stop	AM	9.4	A	8.3	A	7.7	A	8.3	A
			PM	16.6	C	9.3	A	9.1	A	9.3	A
7	Chaucer Street/Palo Alto Avenue	Two-Way Stop	AM	11.9	B	9.0	A	9.0	A	9.0	A
			PM	26.1	D	9.4	A	9.4	A	9.4	A
8	Chaucer Street/University Avenue	Signalized	AM	10.4	B	4.3	A	4.3	A	4.3	A
			PM	10.3	B	4.8	A	4.8	A	4.8	A
9	Woodland Avenue/University Avenue	Signalized	AM	39.0	D	41.5	D	41.5	D	41.5	D
			PM	39.3	D	51.9	D	51.9	D	51.9	D

Notes:

[1] Delay: Overall intersection delay in seconds per vehicle for signalized and unsignalized all-way stop controlled intersections. Delay for minor approach worst movement or major approach critical movements at unsignalized one-way and two-way stop controlled intersections.

[2] Err indicates error in calculating delay as the volume greatly exceeds capacity.

Bold indicates unacceptable LOS.

Table 7: Mitigation Measures 95th Percentile Queue Lengths (ft.)

#	Study Intersection	Lane Group	Storage Length per lane (feet)	Existing Conditions		Existing + Bridge Closure Conditions		Mitigation Measures-Option 1		Mitigation Measures-Option 2	
				A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
1	Willow Road/Gilbert Avenue	EBL	55	#90	29	#90	29	48	26	#90	29
		EBTR	400	147	93	147	93	112	81	147	93
		WBL	90	#188	113	#188	113	378	201	#188	113
		WBTR	320	#333	137	#333	137	237	118	#333	137
		NBL	75	m3	3	m3	3	m2	4	m3	3
		NBTR	450	363	44	363	44	258	67	363	44
		SBL	90	31	33	31	32	81	47	31	32
		SBTR	455	497	207	497	207	953	302	497	207
2	Willow Road/Middlefield Road	EBL	270	#346	210	#346	210	#346	213	#346	210
		EBTR	1025	304	420	304	420	304	423	304	420
		WBL	120	133	182	133	182	133	190	m101	182
		WBT	330	303	484	303	484	303	#508	280	484
		WBR	65	175	80	175	80	175	83	135	80
		NBL	75	69	80	69	80	69	80	69	80
		NBT	1010	#360	172	#360	172	#360	172	#360	172
		NBR	110	101	48	101	48	101	48	101	48
		SBL	150	m307	330	m307	332	m307	390	m307	332
		SBL	250	m315	331	m315	331	m315	392	m315	331
		SBR	65	408	309	408	309	408	323	408	309
3	Middlefield Road/Palo Alto Avenue-Woodland Avenue	EBL	50	7	34	7	40	7	40	m62	#261
		EBT	350	0	0	0	0	0	0	59	141
		EBT	350	0	0	0	0	0	0	59	141
		WBTR	415	0	0	0	0	0	0	347	**#953**
		SBL	30	11	75	**327**	**Err**[2]	36	**198**	**154**	**146**
		SBR	810	33	52	34	61	34	61	38	25
4	Middlefield Road/Palo Alto Avenue	EBL	40	2	5	2	7	2	7	2	7
		EBT	505	0	0	0	0	0	0	0	0
		WBTR	655	0	0	0	0	0	0	0	0
		SBLR	630	4	14	6	19	6	19	6	19
5	Pope Street/Central Avenue	EBLT	245	0	0	0	0	0	0	0	0
		WBTR	300	0	0	0	0	0	0	0	0
		SBLR	665	10	4	10	4	1	1	10	4

#	Study Intersection	Lane Group	Storage Length per lane (feet)	Existing Conditions		Existing + Bridge Closure Conditions		Mitigation Measures-Option 1		Mitigation Measures-Option 2	
				A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
6	Woodland Avenue/Pope Street-Chaucer Street	EBLTR	310	60	53	59	47	43	53	62	49
		WBLTR	110	58	**124**	0	0	0	0	0	0
		NBLTR	595	45	71	43	74	45	77	42	74
		SBLTR	500	76	68	67	73	61	67	67	70
7	Palo Alto Avenue/Chaucer Street	EBLTR	110	0	0	0	0	0	0	0	0
		WBLTR	470	0	0	0	0	0	0	0	0
		NBLTR	510	3	104	1	2	1	2	1	2
		SBLTR	950	2	1	1	1	1	1	1	1
8	Chaucer Street/University Avenue	EBLTR	470	165	88	14	20	14	20	14	20
		WBLTR	530	46	129	24	31	24	31	24	31
		NBLTR	505	147	46	70	80	70	80	70	80
		SBLTR	365	338	208	174	237	174	237	174	237
9	Woodland Avenue/University Avenue	EBL	580	#162	#235	#195	#238	#195	#238	#195	#238
		EBTR	580	126	178	#194	#285	#194	#285	#194	#285
		WBLTR	500	#442	#419	#442	#419	#442	#419	#442	#419
		NBL	160	68	53	103	#431	103	#431	103	#431
		NBTR	536	231	283	231	284	231	284	231	284
		SBL	210	192	134	192	134	192	134	192	134
		SBT	443	326	167	329	178	329	178	329	178
		SBR	443	66	55	71	71	71	71	71	71

Notes:

- 95th percentile volume exceeds capacity, queue maybe longer. Queue shown is maximum after two cycles.

m – Volume for 95th percentile queue is metered by upstream signal.

[1] Synchro does not provide queue lengths for all-way stop control intersections. Queues were obtained from SimTraffic.

[2] Err indicates error in calculating delay as the volume greatly exceeds capacity.

Bold indicates 95th Percentile Queue Lengths higher than existing capacity.

CONCLUSION

Based on the LOS and delay analyses conducted at the eight study intersections, it was observed that under existing year (2018) conditions, all intersections operate with acceptable levels of service during the weekday a.m. and p.m. peak periods with the exception of Middlefield Road/Woodland Avenue-Palo Alto Avenue, which operates at LOS F during the p.m. peak period.

Under existing plus bridge closure conditions, Middlefield Road/Woodland Avenue-Palo Alto Avenue experiences significant impact as a result of the bridge closure and operates at LOS F with significantly higher delay because of the rerouted trips during both a.m. and p.m. peak periods.

TJKM evaluated two potential mitigation measures to mitigate impacts experienced at the intersection of Middlefield Road/Woodland Avenue-Palo Alto Avenue as provided below.

1. Option 1: Providing detour signs and activating real time closures on GPS navigation applications to divert traffic onto Willow Road rather than Woodland Avenue to get on to Middlefield Road. This would reduce the delay experienced at the intersection because of rerouted trips during commute hours.
2. Option 2: Providing temporary traffic signal at Middlefield Road/Woodland Avenue-Palo Alto Avenue enabling the intersection to operate with acceptable LOS standards.

Based on the analysis conducted for the two options, the intersection of Woodland Avenue/Middlefield Road still experiences significant impact and operates with unacceptable LOS E and F during the a.m. and p.m. peak hours respectively, however, with significantly lower delay under Option 1 scenario. This intersection operates at acceptable LOS for the a.m. and p.m. peak hours under the Option 2 scenario, however, with higher queue lengths for the westbound direction during the p.m. peak period.

With full closure of the Pope St-Chaucer Street Bridge, pedestrians and bicyclists currently using the bridge would experience significant impacts with no alternate routes available within the immediate vicinity of the bridge. Additionally, there are two bus stops located within close proximity of the bridge, Woodland Avenue & Woodland Court for Routes 83 and 88 and University Avenue & Chaucer Street for Routes 280, 281, 296 and 397. Pedestrians and bicyclists using transit would experience higher delays with the closure of the bridge if they were crossing the bridge to reach their preferred bus stop.

Alternate solutions to mitigate impact faced by pedestrians and bicyclists could include construction staging or constructing temporary pedestrian and bicycle access over the San Francisquito Creek. Options such as adding crosswalk flashing beacons and green bike lanes at Middlefield Road/Woodland Avenue were considered, however, they were deemed unfeasible due to impacts to traffic operations along Middlefield Road and limitations of right-of-way availability.

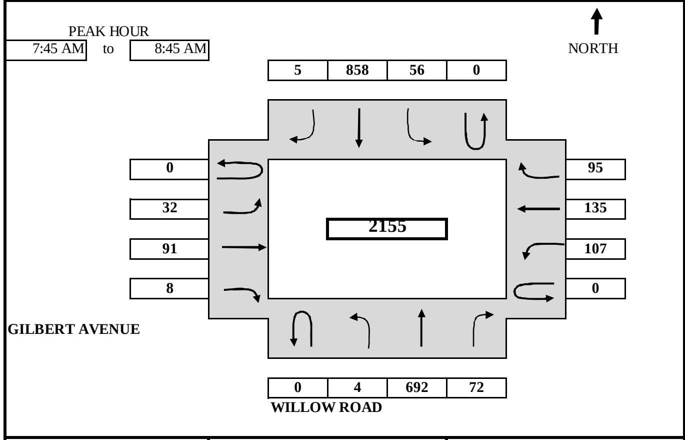
Appendix A – Traffic Counts

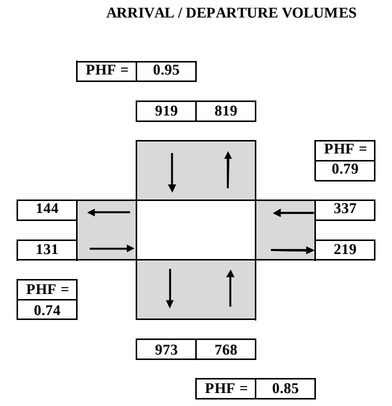
- Turning Movement Vehicles, Bicyclists and Conflicting Pedestrian Counts

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**WILLOW ROAD**	**SURVEY TIME:**	**7:00 AM**	**TO**	**9:00 AM**
E-W APPROACH:	**GILBERT AVENUE**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-1AM**





TIME	PERIOD		NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
7:00 AM	to	7:15 AM		1	72	5		3	238	0		5	1	0		6	3	12	346
7:15 AM	to	7:30 AM		1	171	9		6	440	1		8	3	4		22	9	23	697
7:30 AM	to	7:45 AM		4	312	20		10	653	1		13	9	6		45	38	45	1156
7:45 AM	to	8:00 AM		6	451	38		21	882	2		19	22	10		74	58	68	1651
8:00 AM	to	8:15 AM		6	660	56		38	1097	3		26	42	10		95	91	92	2216
8:15 AM	to	8:30 AM		7	809	75		53	1311	4		31	73	11		125	137	122	2758
8:30 AM	to	8:45 AM		8	1004	92		66	1511	6		45	100	14		152	173	140	3311
8:45 AM	to	9:00 AM		8	1175	101		82	1711	6		49	113	19		170	196	159	3789
TOTAL BY PERIOD																			
7:00 AM	to	7:15 AM	0	1	72	5	0	3	238	0	0	5	1	0	0	6	3	12	346
7:15 AM	to	7:30 AM	0	0	99	4	0	3	202	1	0	3	2	4	0	16	6	11	351
7:30 AM	to	7:45 AM	0	3	141	11	0	4	213	0	0	5	6	2	0	23	29	22	459
7:45 AM	to	8:00 AM	0	2	139	18	0	11	229	1	0	6	13	4	0	29	20	23	495
8:00 AM	to	8:15 AM	0	0	209	18	0	17	215	1	0	7	20	0	0	21	33	24	565
8:15 AM	to	8:30 AM	0	1	149	19	0	15	214	1	0	5	31	1	0	30	46	30	542
8:30 AM	to	8:45 AM	0	1	195	17	0	13	200	2	0	14	27	3	0	27	36	18	553
8:45 AM	to	9:00 AM	0	0	171	9	0	16	200	0	0	4	13	5	0	18	23	19	478
HOURLY TOTALS																			
7:00 AM	to	8:00 AM	0	6	451	38	0	21	882	2	0	19	22	10	0	74	58	68	1651
7:15 AM	to	8:15 AM	0	5	588	51	0	35	859	3	0	21	41	10	0	89	88	80	1870
7:30 AM	to	8:30 AM	0	6	638	66	0	47	871	3	0	23	70	7	0	103	128	99	2061
7:45 AM	to	8:45 AM	0	4	692	72	0	56	858	5	0	32	91	8	0	107	135	95	2155
8:00 AM	to	9:00 AM	0	2	724	63	0	61	829	4	0	30	91	9	0	96	138	91	2138

PEAK HOUR SUMMARY

7:45 AM to 8:45 AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	
VOLUME	0	4	692	72	0	56	858	5	0	32	91	8	0	107	135	95	2155
PHF BY MOVEMENT	0.00	0.50	0.83	0.95	0.00	0.82	0.94	0.63	0.00	0.57	0.73	0.50	0.00	0.89	0.73	0.79	OVERALL
PHF BY APPROACH	0.85				0.95				0.74				0.79				0.95
BICYCLE	11				20				8				18				57
PEDESTRIAN	10				5				3				10				28
	N-LEG				S-LEG				E-LEG				W-LEG				
PEDESTRIAN BY LEG:	2				11				8				7				28

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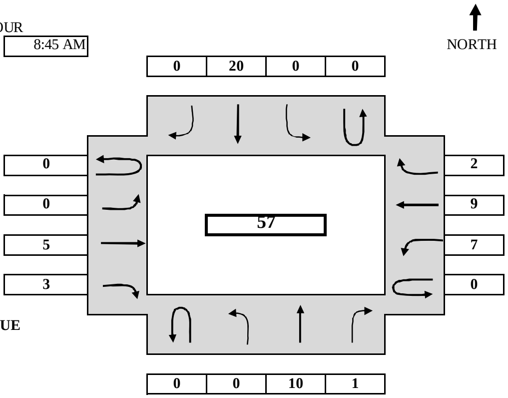
B.A.Y.M.E.T.R.I.C.S.

BICYCLE TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**WILLOW ROAD**	**SURVEY TIME:**	**7:00 AM**	**TO**	**9:00 AM**
E-W APPROACH:	**GILBERT AVENUE**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-1AM**

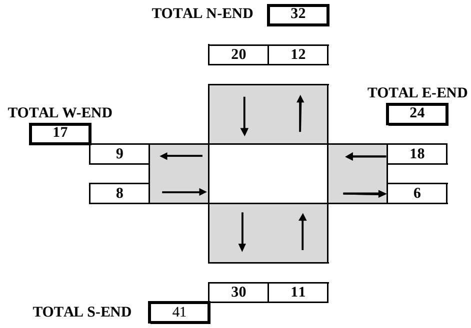
PEAK HOUR
7:45 AM to 8:45 AM



GILBERT AVENUE

WILLOW ROAD

PEAK HOUR
TOTAL BICYCLE VOLUMES
114



TIME PERIOD			NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
7:00 AM	to	7:15 AM	0	0	0	0	0	0	2	1	0	0	1	0	0	0	0	0	**4**
7:15 AM	to	7:30 AM	0	0	2	0	0	1	5	1	0	0	1	0	0	2	1	0	**13**
7:30 AM	to	7:45 AM	0	0	5	0	0	1	8	1	0	0	1	0	0	3	4	1	**24**
7:45 AM	to	8:00 AM	0	0	5	0	0	1	18	1	0	0	1	1	0	10	5	1	**43**
8:00 AM	to	8:15 AM	0	0	10	0	0	1	23	1	0	0	3	2	0	10	10	2	**62**
8:15 AM	to	8:30 AM	0	0	12	1	0	1	24	1	0	0	6	2	0	10	12	2	**71**
8:30 AM	to	8:45 AM	0	0	15	1	0	1	28	1	0	0	6	3	0	10	13	3	**81**
8:45 AM	to	9:00 AM	0	0	20	1	0	1	30	1	0	0	6	3	0	10	15	3	**90**
TOTAL BY PERIOD																			
7:00 AM	to	7:15 AM	0	0	0	0	0	0	2	1	0	0	1	0	0	0	0	0	**4**
7:15 AM	to	7:30 AM	0	0	2	0	0	1	3	0	0	0	0	0	0	2	1	0	**9**
7:30 AM	to	7:45 AM	0	0	3	0	0	0	3	0	0	0	0	0	0	1	3	1	**11**
7:45 AM	to	8:00 AM	0	0	0	0	0	0	10	0	0	0	0	1	0	7	1	0	**19**
8:00 AM	to	8:15 AM	0	0	5	0	0	0	5	0	0	0	2	1	0	0	5	1	**19**
8:15 AM	to	8:30 AM	0	0	2	1	0	0	1	0	0	0	3	0	0	0	2	0	**9**
8:30 AM	to	8:45 AM	0	0	3	0	0	0	4	0	0	0	0	1	0	0	1	1	**10**
8:45 AM	to	9:00 AM	0	0	5	0	0	0	2	0	0	0	0	0	0	0	2	0	**9**
HOURLY TOTALS																			
7:00 AM	to	8:00 AM	0	0	5	0	0	1	18	1	0	0	1	1	0	10	5	1	**43**
7:15 AM	to	8:15 AM	0	0	10	0	0	1	21	0	0	0	2	2	0	10	10	2	**58**
7:30 AM	to	8:30 AM	0	0	10	1	0	0	19	0	0	0	5	2	0	8	11	2	**58**
7:45 AM	to	8:45 AM	0	0	10	1	0	0	20	0	0	0	5	3	0	7	9	2	**57**
8:00 AM	to	9:00 AM	0	0	15	1	0	0	12	0	0	0	5	2	0	0	10	2	**47**

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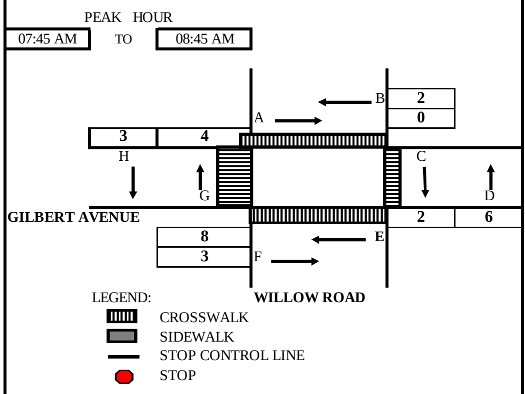
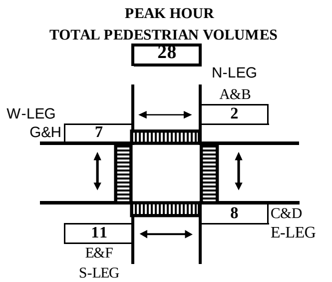
7:45 AM to 8:45 AM					
APPROACH VOLUME	NB	SB	EB	WB	TOTAL
BICYCLE	11	20	8	18	**57**

B.A.Y.M.E.T.R.I.C.S.

PEDESTRIAN MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**			**SURVEY DATE:**	**5/22/2018**
N-S APPROACH:	**WILLOW ROAD**			**DAY:**	**TUESDAY**
E-W APPROACH:	**GILBERT AVENUE**			**JURISDICTION:**	**PALO ALTO**
SURVEY PERIOD:	**7:00 AM**	**TO**	**9:00 AM**	**FILE:**	**3805030-1AM**





BY LEG:		**BY DIRECTION:**	
N-LEG	2	**NB**(D+G)	10
S-LEG	11	**SB**(C+H)	5
E-LEG	8	**EB**(A+F)	3
W-LEG	7	**WB**(B+E)	10

TIME PERIOD			**NORTH X-WALK**		**EAST X-WALK**		**SOUTH X-WALK**		**WEST X-WALK**		
From		**To**	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***TOTAL***
						SURVEY DATA					
07:00 AM	---	07:15 AM	0	0	0	0	0	1	0	0	*1*
07:15 AM	---	07:30 AM	0	0	1	0	0	1	1	2	*5*
07:30 AM	---	07:45 AM	1	1	4	0	1	1	1	6	*15*
07:45 AM	---	08:00 AM	1	1	4	0	5	1	2	7	*21*
08:00 AM	---	08:15 AM	1	3	4	2	6	1	2	8	*27*
08:15 AM	---	08:30 AM	1	3	4	5	7	2	2	9	*33*
08:30 AM	---	08:45 AM	1	3	6	6	9	4	5	9	*43*
08:45 AM	---	09:00 AM	2	4	8	7	9	6	7	10	*53*
						TOTAL BY PERIOD					
07:00 AM	---	07:15 AM	0	0	0	0	0	1	0	0	*1*
07:15 AM	---	07:30 AM	0	0	1	0	0	0	1	2	*4*
07:30 AM	---	07:45 AM	1	1	3	0	1	0	0	4	*10*
07:45 AM	---	08:00 AM	0	0	0	0	4	0	1	1	*6*
08:00 AM	---	08:15 AM	0	2	0	2	1	0	0	1	*6*
08:15 AM	---	08:30 AM	0	0	0	3	1	1	0	1	*6*
08:30 AM	---	08:45 AM	0	0	2	1	2	2	3	0	*10*
08:45 AM	---	09:00 AM	1	1	2	1	0	2	2	1	*10*
						HOURLY TOTALS					
07:00 AM	---	08:00 AM	1	1	4	0	5	1	2	7	*21*
07:15 AM	---	08:15 AM	1	3	4	2	6	0	2	8	*26*
07:30 AM	---	08:30 AM	1	3	3	5	7	1	1	7	*28*
07:45 AM	---	08:45 AM	0	2	2	6	8	3	4	3	*28*
08:00 AM	---	09:00 AM	1	3	4	7	4	5	5	3	*32*

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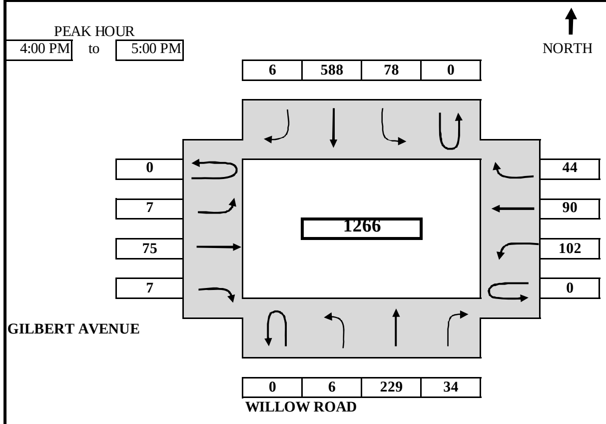
7:45 AM to 8:45 AM					
VOLUME BY DIRECTION	NB	SB	EB	WB	TOTAL
PEDESTRIAN	10	5	3	10	**28**
VOLUME BY LEG	N-LEG	S-LEG	E-LEG	W-LEG	TOTAL
PEDESTRIAN	2	11	8	7	**28**

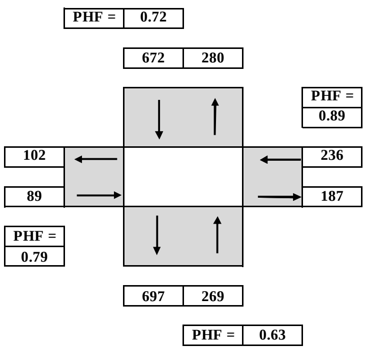
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**WILLOW ROAD**	**SURVEY TIME:**	**4:00 PM**	**TO**	**6:00 PM**
E-W APPROACH:	**GILBERT AVENUE**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-1PM**



ARRIVAL / DEPARTURE VOLUMES



TIME	PERIOD		NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
									SURVEY DATA										
4:00 PM	to	4:15 PM		0	97	9		14	156	3		2	17	1		30	18	18	**365**
4:15 PM	to	4:30 PM		4	159	15		31	371	4		5	41	2		59	42	27	**760**
4:30 PM	to	4:45 PM		5	194	28		53	440	4		6	60	5		81	71	34	**981**
4:45 PM	to	5:00 PM		6	229	34		78	588	6		7	75	7		102	90	44	**1266**
5:00 PM	to	5:15 PM		8	267	46		104	704	7		12	90	12		124	107	54	**1535**
5:15 PM	to	5:30 PM		8	311	61		126	859	11		15	101	14		146	138	60	**1850**
5:30 PM	to	5:45 PM		9	330	63		140	992	11		19	123	20		159	156	68	**2090**
5:45 PM	to	6:00 PM		9	351	77		166	1125	13		21	135	23		180	172	75	**2347**
									TOTAL BY PERIOD										
4:00 PM	to	4:15 PM	0	0	97	9	0	14	156	3	0	2	17	1	0	30	18	18	**365**
4:15 PM	to	4:30 PM	0	4	62	6	0	17	215	1	0	3	24	1	0	29	24	9	**395**
4:30 PM	to	4:45 PM	0	1	35	13	0	22	69	0	0	1	19	3	0	22	29	7	**221**
4:45 PM	to	5:00 PM	0	1	35	6	0	25	148	2	0	1	15	2	0	21	19	10	**285**
5:00 PM	to	5:15 PM	0	2	38	12	0	26	116	1	0	5	15	5	0	22	17	10	**269**
5:15 PM	to	5:30 PM	0	0	44	15	0	22	155	4	0	3	11	2	0	22	31	6	**315**
5:30 PM	to	5:45 PM	0	1	19	2	0	14	133	0	0	4	22	6	0	13	18	8	**240**
5:45 PM	to	6:00 PM	0	0	21	14	0	26	133	2	0	2	12	3	0	21	16	7	**257**
									HOURLY TOTALS										
4:00 PM	to	5:00 PM	0	6	229	34	0	78	588	6	0	7	75	7	0	102	90	44	**1266**
4:15 PM	to	5:15 PM	0	8	170	37	0	90	548	4	0	10	73	11	0	94	89	36	**1170**
4:30 PM	to	5:30 PM	0	4	152	46	0	95	488	7	0	10	60	12	0	87	96	33	**1090**
4:45 PM	to	5:45 PM	0	4	136	35	0	87	552	7	0	13	63	15	0	78	85	34	**1109**
5:00 PM	to	6:00 PM	0	3	122	43	0	88	537	7	0	14	60	16	0	78	82	31	**1081**

PEAK HOUR SUMMARY

4:00 PM to 5:00 PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	
VOLUME	0	6	229	34	0	78	588	6	0	7	75	7	0	102	90	44	**1266**
PHF BY MOVEMENT	0.00	0.38	0.59	0.65	0.00	0.78	0.68	0.50	0.00	0.58	0.78	0.58	0.00	0.85	0.78	0.61	OVERALL
PHF BY APPROACH	0.63				0.72				0.79				0.89				0.80
BICYCLE	11				5				9				0				**25**
PEDESTRIAN	18				7				7				8				**40**
	N-LEG				**S-LEG**				**E-LEG**				**W-LEG**				
PEDESTRIAN BY LEG:	6				9				17				8				**40**

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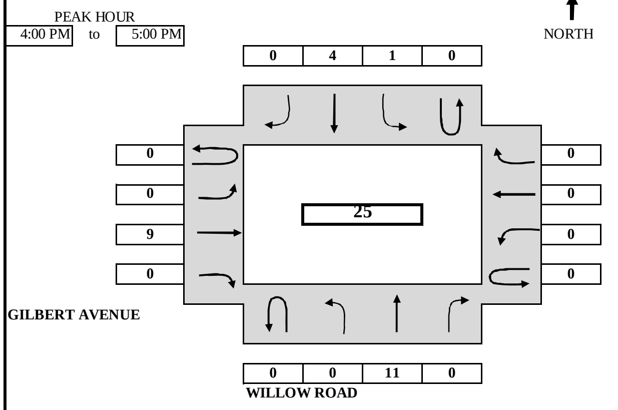
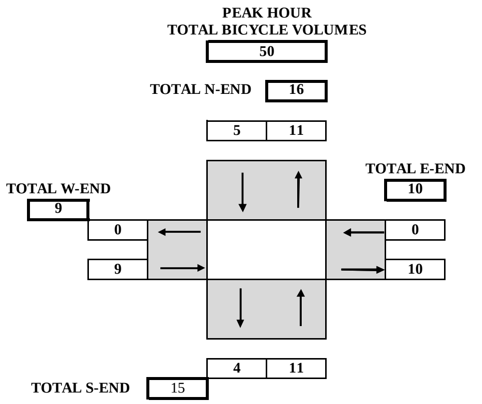
B.A.Y.M.E.T.R.I.C.S.

BICYCLE TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**WILLOW ROAD**	**SURVEY TIME:**	**4:00 PM**	**TO**	**6:00 PM**
E-W APPROACH:	**GILBERT AVENUE**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-1PM**





TIME		PERIOD	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
4:00 PM	to	4:15 PM	0	0	1	0	0	0	2	0	0	0	1	0	0	0	0	0	**4**
4:15 PM	to	4:30 PM	0	0	3	0	0	0	2	0	0	0	5	0	0	0	0	0	**10**
4:30 PM	to	4:45 PM	0	0	10	0	0	0	3	0	0	0	6	0	0	0	0	0	**19**
4:45 PM	to	5:00 PM	0	0	11	0	0	1	4	0	0	0	9	0	0	0	0	0	**25**
5:00 PM	to	5:15 PM	0	0	14	0	0	1	7	0	0	0	11	0	0	0	0	0	**33**
5:15 PM	to	5:30 PM	0	0	20	0	0	1	10	0	0	0	13	0	0	0	0	0	**44**
5:30 PM	to	5:45 PM	0	0	22	0	0	1	12	0	0	0	15	0	0	0	0	0	**50**
5:45 PM	to	6:00 PM	0	0	26	0	0	3	18	0	0	0	17	1	0	1	2	0	**68**
TOTAL BY PERIOD																			
4:00 PM	to	4:15 PM	0	0	1	0	0	0	2	0	0	0	1	0	0	0	0	0	**4**
4:15 PM	to	4:30 PM	0	0	2	0	0	0	0	0	0	0	4	0	0	0	0	0	**6**
4:30 PM	to	4:45 PM	0	0	7	0	0	0	1	0	0	0	1	0	0	0	0	0	**9**
4:45 PM	to	5:00 PM	0	0	1	0	0	1	1	0	0	0	3	0	0	0	0	0	**6**
5:00 PM	to	5:15 PM	0	0	3	0	0	0	3	0	0	0	2	0	0	0	0	0	**8**
5:15 PM	to	5:30 PM	0	0	6	0	0	0	3	0	0	0	2	0	0	0	0	0	**11**
5:30 PM	to	5:45 PM	0	0	2	0	0	0	2	0	0	0	2	0	0	0	0	0	**6**
5:45 PM	to	6:00 PM	0	0	4	0	0	2	6	0	0	0	2	1	0	1	2	0	**18**
HOURLY TOTALS																			
4:00 PM	to	5:00 PM	0	0	11	0	0	1	4	0	0	0	9	0	0	0	0	0	**25**
4:15 PM	to	5:15 PM	0	0	13	0	0	1	5	0	0	0	10	0	0	0	0	0	**29**
4:30 PM	to	5:30 PM	0	0	17	0	0	1	8	0	0	0	8	0	0	0	0	0	**34**
4:45 PM	to	5:45 PM	0	0	12	0	0	1	9	0	0	0	9	0	0	0	0	0	**31**
5:00 PM	to	6:00 PM	0	0	15	0	0	2	14	0	0	0	8	1	0	1	2	0	**43**

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4:00 PM to 5:00 PM					
APPROACH VOLUME	NB	SB	EB	WB	TOTAL
BICYCLE	11	5	9	0	**25**

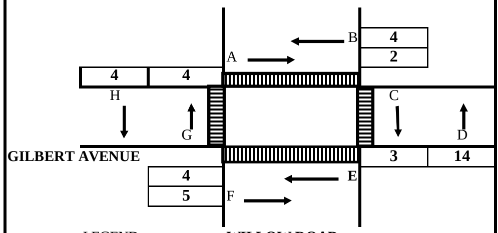
B.A.Y.M.E.T.R.I.C.S.

PEDESTRIAN MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**
N-S APPROACH:	**WILLOW ROAD**	**DAY:**	**TUESDAY**
E-W APPROACH:	**GILBERT AVENUE**	**JURISDICTION:**	**PALO ALTO**
SURVEY PERIOD:	**4:00 PM TO 6:00 PM**	**FILE:**	**3805030-1PM**

PEAK HOUR

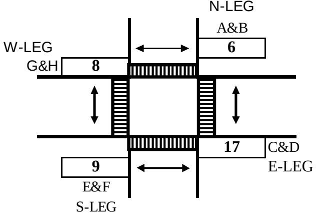
04:00 PM TO 05:00 PM



PEAK HOUR

TOTAL PEDESTRIAN VOLUMES

40



LEGEND:

WILLOW ROAD

- ▥ CROSSWALK
- ▬ SIDEWALK
- — STOP CONTROL LINE
- ● STOP

BY LEG:

N-LEG	**6**
S-LEG	**9**
E-LEG	**17**
W-LEG	**8**

BY DIRECTION:

NB(D+G)	**18**
SB(C+H)	**7**
EB(A+F)	**7**
WB(B+E)	**8**

TIME PERIOD			**NORTH X-WALK**		**EAST X-WALK**		**SOUTH X-WALK**		**WEST X-WALK**		
From		**To**	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***TOTAL***
SURVEY DATA											
04:00 PM	---	04:15 PM	0	2	0	6	3	1	0	2	***14***
04:15 PM	---	04:30 PM	0	2	2	7	3	3	0	4	***21***
04:30 PM	---	04:45 PM	1	4	2	12	3	5	2	4	***33***
04:45 PM	---	05:00 PM	2	4	3	14	4	5	4	4	***40***
05:00 PM	---	05:15 PM	4	5	4	19	4	5	4	6	***51***
05:15 PM	---	05:30 PM	4	5	10	19	5	8	8	9	***68***
05:30 PM	---	05:45 PM	4	7	13	28	11	11	10	9	***93***
05:45 PM	---	06:00 PM	6	7	13	31	12	11	12	9	***101***
TOTAL BY PERIOD											
04:00 PM	---	04:15 PM	0	2	0	6	3	1	0	2	***14***
04:15 PM	---	04:30 PM	0	0	2	1	0	2	0	2	***7***
04:30 PM	---	04:45 PM	1	2	0	5	0	2	2	0	***12***
04:45 PM	---	05:00 PM	1	0	1	2	1	0	2	0	***7***
05:00 PM	---	05:15 PM	2	1	1	5	0	0	0	2	***11***
05:15 PM	---	05:30 PM	0	0	6	0	1	3	4	3	***17***
05:30 PM	---	05:45 PM	0	2	3	9	6	3	2	0	***25***
05:45 PM	---	06:00 PM	2	0	0	3	1	0	2	0	***8***
HOURLY TOTALS											
04:00 PM	---	05:00 PM	2	4	3	14	4	5	4	4	***40***
04:15 PM	---	05:15 PM	4	3	4	13	1	4	4	4	***37***
04:30 PM	---	05:30 PM	4	3	8	12	2	5	8	5	***47***
04:45 PM	---	05:45 PM	3	3	11	16	8	6	8	5	***60***
05:00 PM	---	06:00 PM	4	3	10	17	8	6	8	5	***61***

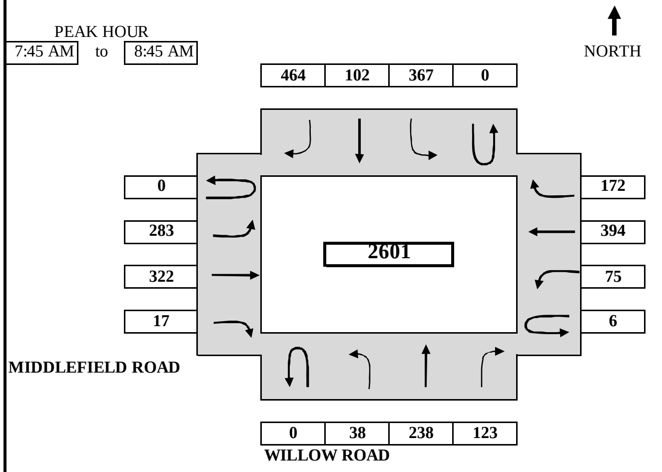
Tel : (510) 232-1271 ***Fax: (510) 232-1272***

4:00 PM to 5:00 PM					
VOLUME BY DIRECTION	NB	SB	EB	WB	TOTAL
PEDESTRIAN	18	7	7	8	**40**
VOLUME BY LEG	N-LEG	S-LEG	E-LEG	W-LEG	TOTAL
PEDESTRIAN	6	9	17	8	**40**

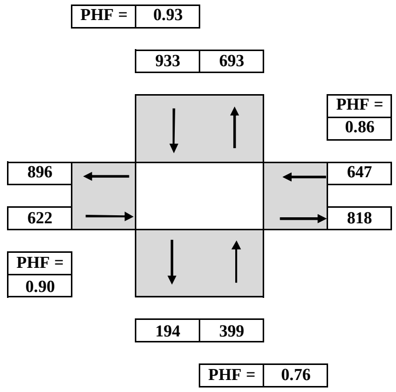
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**WILLOW ROAD**	**SURVEY TIME:**	**7:00 AM**	**TO**	**9:00 AM**
E-W APPROACH:	**MIDDLEFIELD ROAD**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-2AM**



ARRIVAL / DEPARTURE VOLUMES



TIME		PERIOD	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
7:00 AM	to	7:15 AM		1	20	12		100	14	122		37	43	1	0	7	45	20	**422**
7:15 AM	to	7:30 AM		2	51	27		177	27	217		82	86	1	0	19	117	46	**852**
7:30 AM	to	7:45 AM		5	92	37		266	42	351		134	148	3	1	41	217	86	**1423**
7:45 AM	to	8:00 AM		12	133	57		373	68	468		193	219	7	1	62	318	121	**2032**
8:00 AM	to	8:15 AM		19	215	100		452	93	590		274	286	10	3	82	396	170	**2690**
8:15 AM	to	8:30 AM		33	270	131		541	118	691		338	383	13	5	97	493	208	**3321**
8:30 AM	to	8:45 AM		43	330	160		633	144	815		417	470	20	7	116	611	258	**4024**
8:45 AM	to	9:00 AM		48	382	176		716	164	921		488	585	24	8	131	687	302	**4632**
TOTAL BY PERIOD																			
7:00 AM	to	7:15 AM	0	1	20	12	0	100	14	122	0	37	43	1	0	7	45	20	**422**
7:15 AM	to	7:30 AM	0	1	31	15	0	77	13	95	0	45	43	0	0	12	72	26	**430**
7:30 AM	to	7:45 AM	0	3	41	10	0	89	15	134	0	52	62	2	1	22	100	40	**571**
7:45 AM	to	8:00 AM	0	7	41	20	0	107	26	117	0	59	71	4	0	21	101	35	**609**
8:00 AM	to	8:15 AM	0	7	82	43	0	79	25	122	0	81	67	3	2	20	78	49	**658**
8:15 AM	to	8:30 AM	0	14	55	31	0	89	25	101	0	64	97	3	2	15	97	38	**631**
8:30 AM	to	8:45 AM	0	10	60	29	0	92	26	124	0	79	87	7	2	19	118	50	**703**
8:45 AM	to	9:00 AM	0	5	52	16	0	83	20	106	0	71	115	4	1	15	76	44	**608**
HOURLY TOTALS																			
7:00 AM	to	8:00 AM	0	12	133	57	0	373	68	468	0	193	219	7	1	62	318	121	**2032**
7:15 AM	to	8:15 AM	0	18	195	88	0	352	79	468	0	237	243	9	3	75	351	150	**2268**
7:30 AM	to	8:30 AM	0	31	219	104	0	364	91	474	0	256	297	12	5	78	376	162	**2469**
7:45 AM	to	8:45 AM	0	38	238	123	0	367	102	464	0	283	322	17	6	75	394	172	**2601**
8:00 AM	to	9:00 AM	0	36	249	119	0	343	96	453	0	295	366	17	7	69	369	181	**2600**

PEAK HOUR SUMMARY

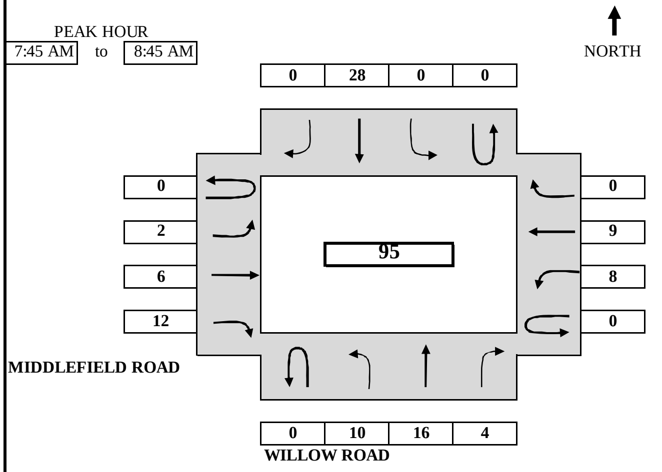
7:45 AM to 8:45 AM	**NORTHBOUND**				**SOUTHBOUND**				**EASTBOUND**				**WESTBOUND**				TOTAL
	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	
VOLUME	0	38	238	123	0	367	102	464	0	283	322	17	6	75	394	172	**2601**
PHF BY MOVEMENT	0.00	0.68	0.73	0.72	0.00	0.86	0.98	0.94	0.00	0.87	0.83	0.61	0.75	0.89	0.83	0.86	OVERALL
PHF BY APPROACH	0.76				0.93				0.90				0.86				0.92
BICYCLE	30				28				20				17				**95**
PEDESTRIAN	11				43				6				17				**77**
	N-LEG				**S-LEG**				**E-LEG**				**W-LEG**				
PEDESTRIAN BY LEG:	22				1				31				23				**77**

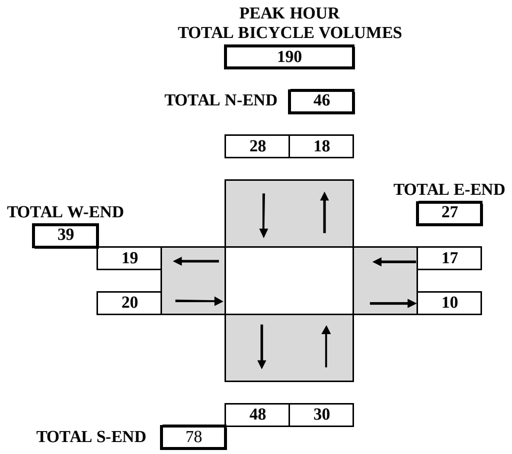
TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

B.A.Y.M.E.T.R.I.C.S.

BICYCLE TURNING MOVEMENT SUMMARY

PROJECT: TRAFFIC COUNTS IN PALO ALTO **SURVEY DATE:** 5/22/2018 **DAY:** TUESDAY
N-S APPROACH: WILLOW ROAD **SURVEY TIME:** 7:00 AM **TO** 9:00 AM
E-W APPROACH: MIDDLEFIELD ROAD **JURISDICTION:** PALO ALTO **FILE:** 3805030-2AM





TIME		PERIOD	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
7:00 AM	to	7:15 AM	0	1	1	0	0	0	4	0	0	0	1	1	0	0	1	0	**9**
7:15 AM	to	7:30 AM	0	5	3	0	0	0	8	0	0	0	1	2	0	0	3	0	**22**
7:30 AM	to	7:45 AM	0	10	5	3	0	0	13	0	0	0	1	2	0	1	3	1	**39**
7:45 AM	to	8:00 AM	0	12	10	5	0	0	19	0	0	1	1	4	0	6	4	1	**63**
8:00 AM	to	8:15 AM	0	13	13	6	0	0	21	0	0	2	4	9	0	7	4	1	**80**
8:15 AM	to	8:30 AM	0	17	17	7	0	0	28	0	0	2	6	13	0	8	7	1	**106**
8:30 AM	to	8:45 AM	0	20	21	7	0	0	41	0	0	2	7	14	0	9	12	1	**134**
8:45 AM	to	9:00 AM	0	23	23	8	0	0	46	0	0	2	9	14	0	9	13	1	**148**
TOTAL BY PERIOD																			
7:00 AM	to	7:15 AM	0	1	1	0	0	0	4	0	0	0	1	1	0	0	1	0	**9**
7:15 AM	to	7:30 AM	0	4	2	0	0	0	4	0	0	0	0	1	0	0	2	0	**13**
7:30 AM	to	7:45 AM	0	5	2	3	0	0	5	0	0	0	0	0	0	1	0	1	**17**
7:45 AM	to	8:00 AM	0	2	5	2	0	0	6	0	0	1	0	2	0	5	1	0	**24**
8:00 AM	to	8:15 AM	0	1	3	1	0	0	2	0	0	1	3	5	0	1	0	0	**17**
8:15 AM	to	8:30 AM	0	4	4	1	0	0	7	0	0	0	2	4	0	1	3	0	**26**
8:30 AM	to	8:45 AM	0	3	4	0	0	0	13	0	0	0	1	1	0	1	5	0	**28**
8:45 AM	to	9:00 AM	0	3	2	1	0	0	5	0	0	0	2	0	0	0	1	0	**14**
HOURLY TOTALS																			
7:00 AM	to	8:00 AM	0	12	10	5	0	0	19	0	0	1	1	4	0	6	4	1	**63**
7:15 AM	to	8:15 AM	0	12	12	6	0	0	17	0	0	2	3	8	0	7	3	1	**71**
7:30 AM	to	8:30 AM	0	12	14	7	0	0	20	0	0	2	5	11	0	8	4	1	**84**
7:45 AM	to	8:45 AM	0	10	16	4	0	0	28	0	0	2	6	12	0	8	9	0	**95**
8:00 AM	to	9:00 AM	0	11	13	3	0	0	27	0	0	1	8	10	0	3	9	0	**85**

TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

7:45 AM to 8:45 AM					
APPROACH VOLUME	NB	SB	EB	WB	TOTAL
BICYCLE	30	28	20	17	**95**

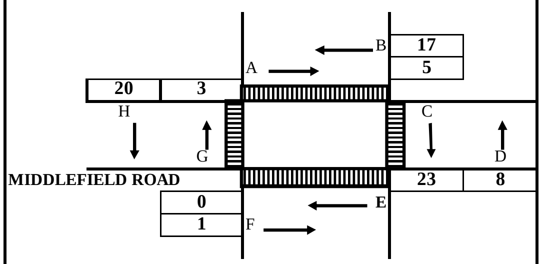
B.A.Y.M.E.T.R.I.C.S.

PEDESTRIAN MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**
N-S APPROACH:	**WILLOW ROAD**	**DAY:**	**TUESDAY**
E-W APPROACH:	**MIDDLEFIELD ROAD**	**JURISDICTION:**	**PALO ALTO**
SURVEY PERIOD	**7:00 AM TO 9:00 AM**	**FILE:**	**3805030-2AM**

PEAK HOUR

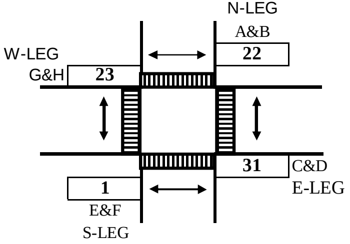
07:45 AM TO 08:45 AM



PEAK HOUR

TOTAL PEDESTRIAN VOLUMES

77



LEGEND: **WILLOW ROAD**

- ▥ CROSSWALK
- ▬ SIDEWALK
- — STOP CONTROL LINE
- ● STOP

BY LEG:	
N-LEG	22
S-LEG	1
E-LEG	31
W-LEG	23

BY DIRECTION:	
NB(D+G)	11
SB(C+H)	43
EB(A+F)	6
WB(B+E)	17

TIME PERIOD			**NORTH X-WALK**		**EAST X-WALK**		**SOUTH X-WALK**		**WEST X-WALK**		
From		**To**	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***TOTAL***
SURVEY DATA											
07:00 AM	---	07:15 AM	0	0	1	0	0	1	0	0	***2***
07:15 AM	---	07:30 AM	0	0	4	2	0	2	0	1	***9***
07:30 AM	---	07:45 AM	0	0	8	2	0	2	2	1	***15***
07:45 AM	---	08:00 AM	1	8	19	2	0	2	2	16	***50***
08:00 AM	---	08:15 AM	5	9	24	4	0	2	2	16	***62***
08:15 AM	---	08:30 AM	5	15	28	7	0	3	4	19	***81***
08:30 AM	---	08:45 AM	5	17	31	10	0	3	5	21	***92***
08:45 AM	---	09:00 AM	9	19	33	16	0	3	5	23	***108***
TOTAL BY PERIOD											
07:00 AM	---	07:15 AM	0	0	1	0	0	1	0	0	***2***
07:15 AM	---	07:30 AM	0	0	3	2	0	1	0	1	***7***
07:30 AM	---	07:45 AM	0	0	4	0	0	0	2	0	***6***
07:45 AM	---	08:00 AM	1	8	11	0	0	0	0	15	***35***
08:00 AM	---	08:15 AM	4	1	5	2	0	0	0	0	***12***
08:15 AM	---	08:30 AM	0	6	4	3	0	1	2	3	***19***
08:30 AM	---	08:45 AM	0	2	3	3	0	0	1	2	***11***
08:45 AM	---	09:00 AM	4	2	2	6	0	0	0	2	***16***
HOURLY TOTALS											
07:00 AM	---	08:00 AM	1	8	19	2	0	2	2	16	***50***
07:15 AM	---	08:15 AM	5	9	23	4	0	1	2	16	***60***
07:30 AM	---	08:30 AM	5	15	24	5	0	1	4	18	***72***
07:45 AM	---	08:45 AM	5	17	23	8	0	1	3	20	***77***
08:00 AM	---	09:00 AM	8	11	14	14	0	1	3	7	***58***

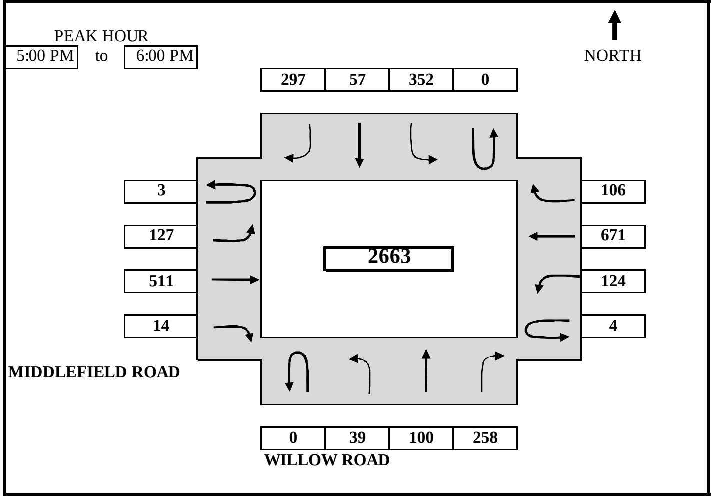
Tel : (510) 232-1271 ***Fax: (510) 232-1272***

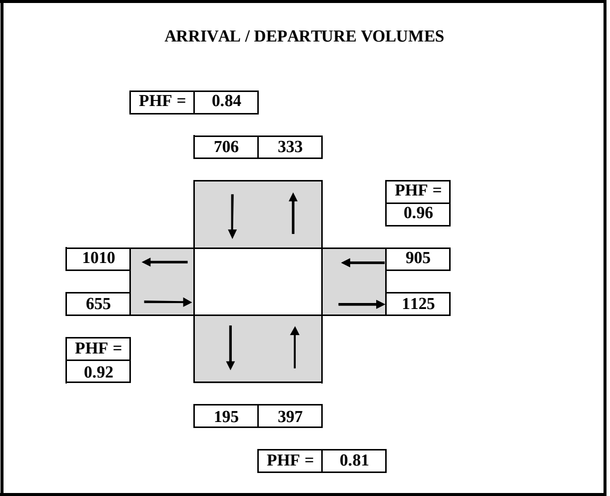
7:45 AM to 8:45 AM					
VOLUME BY DIRECTION	NB	SB	EB	WB	TOTAL
PEDESTRIAN	11	43	6	17	77
VOLUME BY LEG	N-LEG	S-LEG	E-LEG	W-LEG	TOTAL
PEDESTRIAN	22	1	31	23	77

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**WILLOW ROAD**	**SURVEY TIME:**	**4:00 PM**	**TO**	**6:00 PM**
E-W APPROACH:	**MIDDLEFIELD ROAD**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-2PM**





TIME		PERIOD	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
4:00 PM	to	4:15 PM		8	18	51		95	22	75	1	42	128	0	0	13	105	38	596
4:15 PM	to	4:30 PM		11	42	100		179	44	161	2	93	262	3	1	32	213	58	1201
4:30 PM	to	4:45 PM		28	58	166		251	69	232	2	133	383	6	2	54	340	73	1797
4:45 PM	to	5:00 PM		35	79	225		334	85	306	2	160	480	9	2	86	466	94	2363
5:00 PM	to	5:15 PM		42	114	306		423	101	375	2	196	620	11	5	116	629	122	3062
5:15 PM	to	5:30 PM		52	136	362		484	116	441	2	225	748	16	6	146	782	150	3666
5:30 PM	to	5:45 PM		64	164	435		591	134	526	4	259	872	18	6	179	959	176	4387
5:45 PM	to	6:00 PM		74	179	483		686	142	603	5	287	991	23	6	210	1137	200	5026
TOTAL BY PERIOD																			
4:00 PM	to	4:15 PM	0	8	18	51	0	95	22	75	1	42	128	0	0	13	105	38	596
4:15 PM	to	4:30 PM	0	3	24	49	0	84	22	86	1	51	134	3	1	19	108	20	605
4:30 PM	to	4:45 PM	0	17	16	66	0	72	25	71	0	40	121	3	1	22	127	15	596
4:45 PM	to	5:00 PM	0	7	21	59	0	83	16	74	0	27	97	3	0	32	126	21	566
5:00 PM	to	5:15 PM	0	7	35	81	0	89	16	69	0	36	140	2	3	30	163	28	699
5:15 PM	to	5:30 PM	0	10	22	56	0	61	15	66	0	29	128	5	1	30	153	28	604
5:30 PM	to	5:45 PM	0	12	28	73	0	107	18	85	2	34	124	2	0	33	177	26	721
5:45 PM	to	6:00 PM	0	10	15	48	0	95	8	77	1	28	119	5	0	31	178	24	639
HOURLY TOTALS																			
4:00 PM	to	5:00 PM	0	35	79	225	0	334	85	306	2	160	480	9	2	86	466	94	2363
4:15 PM	to	5:15 PM	0	34	96	255	0	328	79	300	1	154	492	11	5	103	524	84	2466
4:30 PM	to	5:30 PM	0	41	94	262	0	305	72	280	0	132	486	13	5	114	569	92	2465
4:45 PM	to	5:45 PM	0	36	106	269	0	340	65	294	2	126	489	12	4	125	619	103	2590
5:00 PM	to	6:00 PM	0	39	100	258	0	352	57	297	3	127	511	14	4	124	671	106	2663

PEAK HOUR SUMMARY

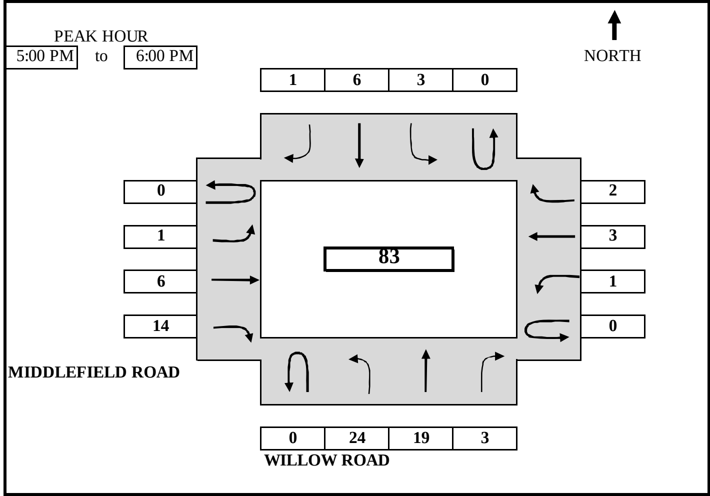
5:00 PM to 6:00 PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	
VOLUME	0	39	100	258	0	352	57	297	3	127	511	14	4	124	671	106	2663
PHF BY MOVEMENT	0.00	0.81	0.71	0.80	0.00	0.82	0.79	0.87	0.38	0.88	0.91	0.70	0.33	0.94	0.94	0.95	OVERALL
PHF BY APPROACH	0.81				0.84				0.92				0.96				0.92
BICYCLE	46				10				21				6				83
PEDESTRIAN	16				23				9				5				53
	N-LEG				S-LEG				E-LEG				W-LEG				
PEDESTRIAN BY LEG:	9				5				28				11				53

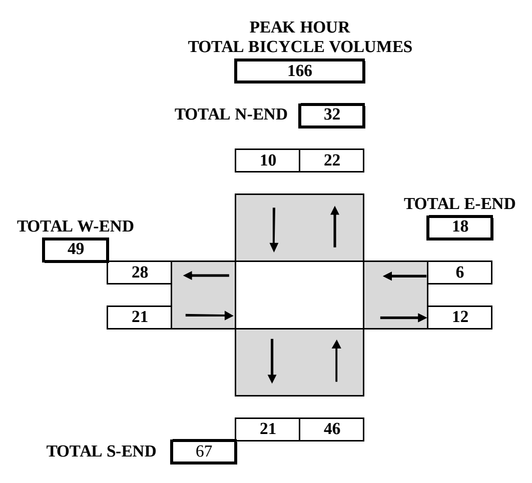
TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

B.A.Y.M.E.T.R.I.C.S.

BICYCLE TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**WILLOW ROAD**	**SURVEY TIME:**	**4:00 PM**	**TO**	**6:00 PM**
E-W APPROACH:	**MIDDLEFIELD ROAD**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-2PM**





TIME From	PERIOD To		NORTHBOUND U-TURN	NORTHBOUND LEFT	NORTHBOUND THRU	NORTHBOUND RIGHT	SOUTHBOUND U-TURN	SOUTHBOUND LEFT	SOUTHBOUND THRU	SOUTHBOUND RIGHT	EASTBOUND U-TURN	EASTBOUND LEFT	EASTBOUND THRU	EASTBOUND RIGHT	WESTBOUND U-TURN	WESTBOUND LEFT	WESTBOUND THRU	WESTBOUND RIGHT	TOTAL
SURVEY DATA																			
4:00 PM	to	4:15 PM	0	3	1	0	0	0	2	1	0	0	0	1	1	0	0	1	**10**
4:15 PM	to	4:30 PM	0	5	4	0	0	1	2	1	0	0	1	1	1	0	0	1	**17**
4:30 PM	to	4:45 PM	0	8	15	0	0	1	2	1	0	1	2	3	1	0	1	1	**36**
4:45 PM	to	5:00 PM	0	11	21	1	0	1	6	2	0	1	3	3	1	0	2	1	**53**
5:00 PM	to	5:15 PM	0	13	24	3	0	1	8	2	0	1	4	9	1	0	3	2	**71**
5:15 PM	to	5:30 PM	0	15	27	3	0	2	8	2	0	1	5	12	1	1	3	3	**83**
5:30 PM	to	5:45 PM	0	26	34	4	0	2	9	2	0	1	7	14	1	1	4	3	**108**
5:45 PM	to	6:00 PM	0	35	40	4	0	4	12	3	0	2	9	17	1	1	5	3	**136**
TOTAL BY PERIOD																			
4:00 PM	to	4:15 PM	0	3	1	0	0	0	2	1	0	0	0	1	1	0	0	1	**10**
4:15 PM	to	4:30 PM	0	2	3	0	0	1	0	0	0	0	1	0	0	0	0	0	**7**
4:30 PM	to	4:45 PM	0	3	11	0	0	0	0	0	0	1	1	2	0	0	1	0	**19**
4:45 PM	to	5:00 PM	0	3	6	1	0	0	4	1	0	0	1	0	0	0	1	0	**17**
5:00 PM	to	5:15 PM	0	2	3	2	0	0	2	0	0	0	1	6	0	0	1	1	**18**
5:15 PM	to	5:30 PM	0	2	3	0	0	1	0	0	0	0	1	3	0	1	0	1	**12**
5:30 PM	to	5:45 PM	0	11	7	1	0	0	1	0	0	0	2	2	0	0	1	0	**25**
5:45 PM	to	6:00 PM	0	9	6	0	0	2	3	1	0	1	2	3	0	0	1	0	**28**
HOURLY TOTALS																			
4:00 PM	to	5:00 PM	0	11	21	1	0	1	6	2	0	1	3	3	1	0	2	1	**53**
4:15 PM	to	5:15 PM	0	10	23	3	0	1	6	1	0	1	4	8	0	0	3	1	**61**
4:30 PM	to	5:30 PM	0	10	23	3	0	1	6	1	0	1	4	11	0	1	3	2	**66**
4:45 PM	to	5:45 PM	0	18	19	4	0	1	7	1	0	0	5	11	0	1	3	2	**72**
5:00 PM	to	6:00 PM	0	24	19	3	0	3	6	1	0	1	6	14	0	1	3	2	**83**

TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

5:00 PM to 6:00 PM					
APPROACH VOLUME	NB	SB	EB	WB	TOTAL
BICYCLE	46	10	21	6	**83**

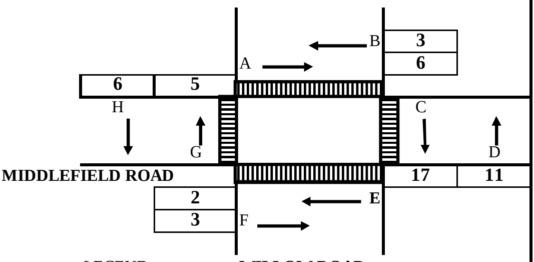
B.A.Y.M.E.T.R.I.C.S.

PEDESTRIAN MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**
N-S APPROACH:	**WILLOW ROAD**	**DAY:**	**TUESDAY**
E-W APPROACH:	**MIDDLEFIELD ROAD**	**JURISDICTION:**	**PALO ALTO**
SURVEY PERIOD	**4:00 PM TO 6:00 PM**	**FILE:**	**3805030-2PM**

PEAK HOUR

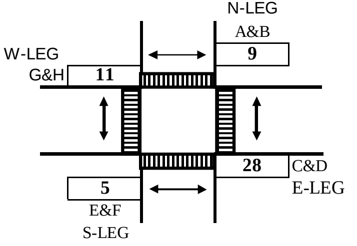
05:00 PM TO 06:00 PM



PEAK HOUR

TOTAL PEDESTRIAN VOLUMES

53



LEGEND:

- ▥ CROSSWALK
- ■ SIDEWALK
- — STOP CONTROL LINE
- ● STOP

BY LEG:		**BY DIRECTION:**	
N-LEG	9	**NB**(D+G)	16
S-LEG	5	**SB**(C+H)	23
E-LEG	28	**EB**(A+F)	9
W-LEG	11	**WB**(B+E)	5

TIME PERIOD			**NORTH X-WALK**		**EAST X-WALK**		**SOUTH X-WALK**		**WEST X-WALK**		
From		**To**	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***TOTAL***
					SURVEY DATA						
04:00 PM	---	04:15 PM	1	1	0	0	0	0	1	1	*4*
04:15 PM	---	04:30 PM	2	4	1	3	1	0	1	1	*13*
04:30 PM	---	04:45 PM	2	5	2	5	1	0	2	1	*18*
04:45 PM	---	05:00 PM	3	6	4	11	4	0	3	3	*34*
05:00 PM	---	05:15 PM	4	6	8	18	5	1	4	8	*54*
05:15 PM	---	05:30 PM	5	6	16	20	5	1	4	9	*66*
05:30 PM	---	05:45 PM	6	8	20	21	5	3	7	9	*79*
05:45 PM	---	06:00 PM	9	9	21	22	6	3	8	9	*87*
					TOTAL BY PERIOD						
04:00 PM	---	04:15 PM	1	1	0	0	0	0	1	1	*4*
04:15 PM	---	04:30 PM	1	3	1	3	1	0	0	0	*9*
04:30 PM	---	04:45 PM	0	1	1	2	0	0	1	0	*5*
04:45 PM	---	05:00 PM	1	1	2	6	3	0	1	2	*16*
05:00 PM	---	05:15 PM	1	0	4	7	1	1	1	5	*20*
05:15 PM	---	05:30 PM	1	0	8	2	0	0	0	1	*12*
05:30 PM	---	05:45 PM	1	2	4	1	0	2	3	0	*13*
05:45 PM	---	06:00 PM	3	1	1	1	1	0	1	0	*8*
					HOURLY TOTALS						
04:00 PM	---	05:00 PM	3	6	4	11	4	0	3	3	*34*
04:15 PM	---	05:15 PM	3	5	8	18	5	1	3	7	*50*
04:30 PM	---	05:30 PM	3	2	15	17	4	1	3	8	*53*
04:45 PM	---	05:45 PM	4	3	18	16	4	3	5	8	*61*
05:00 PM	---	06:00 PM	6	3	17	11	2	3	5	6	*53*

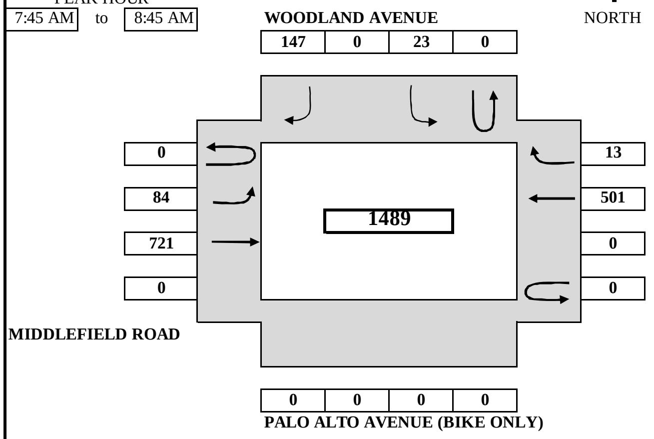
Tel : (510) 232-1271 ***Fax: (510) 232-1272***

5:00 PM to 6:00 PM					
VOLUME BY DIRECTION	NB	SB	EB	WB	TOTAL
PEDESTRIAN	16	23	9	5	**53**
VOLUME BY LEG	N-LEG	S-LEG	E-LEG	W-LEG	TOTAL
PEDESTRIAN	9	5	28	11	**53**

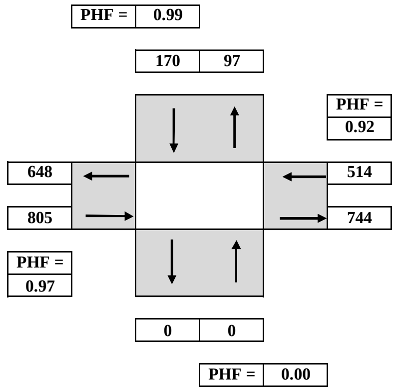
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT: TRAFFIC COUNTS IN PALO ALTO **SURVEY DATE:** 5/22/2018 **DAY:** TUESDAY
N-S APPROACH: PALO ALTO AVENUE - WOODLAND AVENUI **SURVEY TIME:** 7:00 AM **TO** 9:00 AM
E-W APPROACH: MIDDLEFIELD ROAD **JURISDICTION:** PALO ALTO **FILE:** 3805030-3AM



ARRIVAL / DEPARTURE VOLUMES



TIME		PERIOD	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
7:00 AM	to	7:15 AM						5		13		3	141				65	1	228
7:15 AM	to	7:30 AM						9		60		7	275				147	2	500
7:30 AM	to	7:45 AM						18		113		12	437				269	5	854
7:45 AM	to	8:00 AM						22		152		24	622				381	11	1212
8:00 AM	to	8:15 AM						30		186		51	790				506	15	1578
8:15 AM	to	8:30 AM						36		222		75	973				632	17	1955
8:30 AM	to	8:45 AM						41		260		96	1158				770	18	2343
8:45 AM	to	9:00 AM						45		275		115	1346				889	19	2689
TOTAL BY PERIOD																			
7:00 AM	to	7:15 AM	0	0	0	0	0	5	0	13	0	3	141	0	0	0	65	1	228
7:15 AM	to	7:30 AM	0	0	0	0	0	4	0	47	0	4	134	0	0	0	82	1	272
7:30 AM	to	7:45 AM	0	0	0	0	0	9	0	53	0	5	162	0	0	0	122	3	354
7:45 AM	to	8:00 AM	0	0	0	0	0	4	0	39	0	12	185	0	0	0	112	6	358
8:00 AM	to	8:15 AM	0	0	0	0	0	8	0	34	0	27	168	0	0	0	125	4	366
8:15 AM	to	8:30 AM	0	0	0	0	0	6	0	36	0	24	183	0	0	0	126	2	377
8:30 AM	to	8:45 AM	0	0	0	0	0	5	0	38	0	21	185	0	0	0	138	1	388
8:45 AM	to	9:00 AM	0	0	0	0	0	4	0	15	0	19	188	0	0	0	119	1	346
HOURLY TOTALS																			
7:00 AM	to	8:00 AM	0	0	0	0	0	22	0	152	0	24	622	0	0	0	381	11	1212
7:15 AM	to	8:15 AM	0	0	0	0	0	25	0	173	0	48	649	0	0	0	441	14	1350
7:30 AM	to	8:30 AM	0	0	0	0	0	27	0	162	0	68	698	0	0	0	485	15	1455
7:45 AM	to	8:45 AM	0	0	0	0	0	23	0	147	0	84	721	0	0	0	501	13	1489
8:00 AM	to	9:00 AM	0	0	0	0	0	23	0	123	0	91	724	0	0	0	508	8	1477

PEAK HOUR SUMMARY

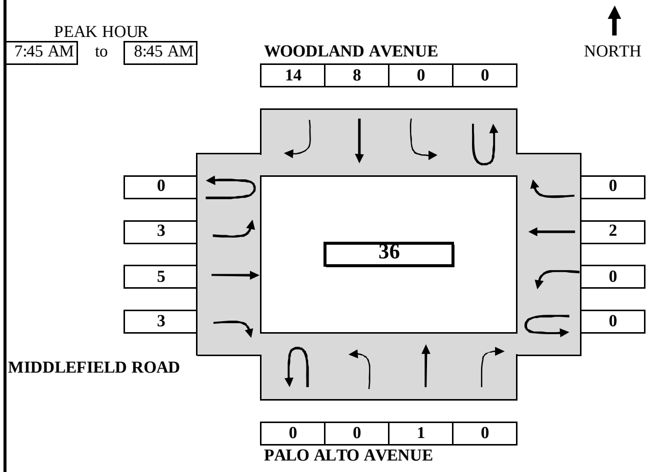
7:45 AM to 8:45 AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	
VOLUME	0	0	0	0	0	23	0	147	0	84	721	0	0	0	501	13	1489
PHF BY MOVEMENT	0.00	0.00	0.00	0.00	0.00	0.72	0.00	0.94	0.00	0.78	0.97	0.00	0.00	0.00	0.91	0.54	OVERALL
PHF BY APPROACH	0.00				0.99				0.97				0.92				0.96
BICYCLE	1				22				11				2				36
PEDESTRIAN	2				4				8				3				17
	N-LEG				S-LEG				E-LEG				W-LEG				
PEDESTRIAN BY LEG:	5				6				6				0				17

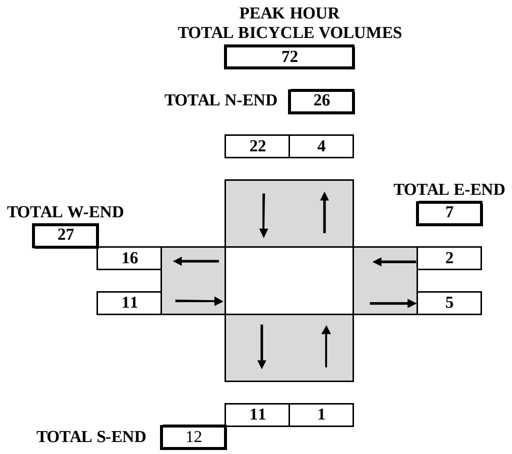
TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

B.A.Y.M.E.T.R.I.C.S.

BICYCLE TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**PALO ALTO AVENUE - WOODLAND AVENUI**	**SURVEY TIME:**	**7:00 AM**	**TO**	**9:00 AM**
E-W APPROACH:	**MIDDLEFIELD ROAD**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-3AM**





TIME From		PERIOD To	NB U-TURN	NB LEFT	NB THRU	NB RIGHT	SB U-TURN	SB LEFT	SB THRU	SB RIGHT	EB U-TURN	EB LEFT	EB THRU	EB RIGHT	WB U-TURN	WB LEFT	WB THRU	WB RIGHT	TOTAL
SURVEY DATA																			
7:00 AM	to	7:15 AM	0	0	2	0	0	0	1	0	0	0	1	0	0	0	1	0	**5**
7:15 AM	to	7:30 AM	0	2	3	0	0	0	2	1	0	0	2	0	0	0	1	0	**11**
7:30 AM	to	7:45 AM	0	2	3	0	0	0	5	5	0	1	4	0	0	0	2	0	**22**
7:45 AM	to	8:00 AM	0	2	3	0	0	0	7	16	0	2	5	0	0	0	3	0	**38**
8:00 AM	to	8:15 AM	0	2	3	0	0	0	11	16	0	2	8	1	0	0	3	0	**46**
8:15 AM	to	8:30 AM	0	2	3	0	0	0	12	17	0	3	9	3	0	0	4	0	**53**
8:30 AM	to	8:45 AM	0	2	4	0	0	0	13	19	0	4	9	3	0	0	4	0	**58**
8:45 AM	to	9:00 AM	0	2	4	0	0	0	14	20	0	5	10	3	0	0	5	1	**64**
TOTAL BY PERIOD																			
7:00 AM	to	7:15 AM	0	0	2	0	0	0	1	0	0	0	1	0	0	0	1	0	**5**
7:15 AM	to	7:30 AM	0	2	1	0	0	0	1	1	0	0	1	0	0	0	0	0	**6**
7:30 AM	to	7:45 AM	0	0	0	0	0	0	3	4	0	1	2	0	0	0	1	0	**11**
7:45 AM	to	8:00 AM	0	0	0	0	0	0	2	11	0	1	1	0	0	0	1	0	**16**
8:00 AM	to	8:15 AM	0	0	0	0	0	0	4	0	0	0	3	1	0	0	0	0	**8**
8:15 AM	to	8:30 AM	0	0	0	0	0	0	1	1	0	1	1	2	0	0	1	0	**7**
8:30 AM	to	8:45 AM	0	0	1	0	0	0	1	2	0	1	0	0	0	0	0	0	**5**
8:45 AM	to	9:00 AM	0	0	0	0	0	0	1	1	0	1	1	0	0	0	1	1	**6**
HOURLY TOTALS																			
7:00 AM	to	8:00 AM	0	2	3	0	0	0	7	16	0	2	5	0	0	0	3	0	**38**
7:15 AM	to	8:15 AM	0	2	1	0	0	0	10	16	0	2	7	1	0	0	2	0	**41**
7:30 AM	to	8:30 AM	0	0	0	0	0	0	10	16	0	3	7	3	0	0	3	0	**42**
7:45 AM	to	8:45 AM	0	0	1	0	0	0	8	14	0	3	5	3	0	0	2	0	**36**
8:00 AM	to	9:00 AM	0	0	1	0	0	0	7	4	0	3	5	3	0	0	2	1	**26**

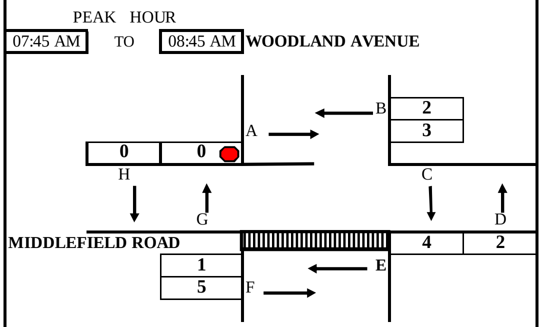
TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

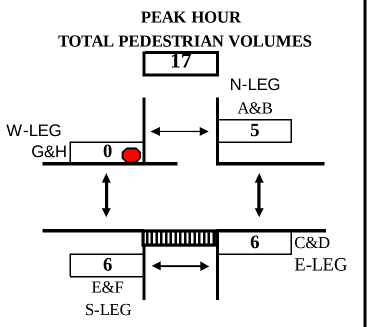
7:45 AM to 8:45 AM					
APPROACH VOLUME	NB	SB	EB	WB	TOTAL
BICYCLE	1	22	11	2	**36**

B.A.Y.M.E.T.R.I.C.S.

PEDESTRIAN MOVEMENT SUMMARY

PROJECT:	TRAFFIC COUNTS IN PALO ALTO	SURVEY DATE:	5/22/2018
N-S APPROACH:	PALO ALTO AVENUE WOODLAND AVENUE	DAY:	TUESDAY
E-W APPROACH:	MIDDLEFIELD ROAD	JURISDICTION:	PALO ALTO
SURVEY PERIOD	7:00 AM TO 9:00 AM	FILE:	3805030-3AM





LEGEND:
- ▥ CROSSWALK
- ▬ SIDEWALK
- — STOP CONTROL LINE
- ● STOP

BY LEG:	
N-LEG	5
S-LEG	6
E-LEG	6
W-LEG	0

BY DIRECTION:	
NB(D+G)	2
SB(C+H)	4
EB(A+F)	8
WB(B+E)	3

TIME PERIOD			NORTH X-WALK		EAST X-WALK		SOUTH X-WALK		WEST X-WALK		
From		To	A	B	C	D	E	F	G	H	TOTAL
SURVEY DATA											
07:00 AM	---	07:15 AM	0	0	0	0	0	0	0	0	*0*
07:15 AM	---	07:30 AM	3	0	1	0	0	0	0	0	*4*
07:30 AM	---	07:45 AM	4	1	1	0	0	1	0	0	*7*
07:45 AM	---	08:00 AM	5	1	1	0	0	2	0	0	*9*
08:00 AM	---	08:15 AM	5	1	2	0	0	2	0	0	*10*
08:15 AM	---	08:30 AM	5	1	3	2	0	5	0	0	*16*
08:30 AM	---	08:45 AM	7	3	5	2	1	6	0	0	*24*
08:45 AM	---	09:00 AM	7	3	5	2	1	7	0	0	*25*
TOTAL BY PERIOD											
07:00 AM	---	07:15 AM	0	0	0	0	0	0	0	0	*0*
07:15 AM	---	07:30 AM	3	0	1	0	0	0	0	0	*4*
07:30 AM	---	07:45 AM	1	1	0	0	0	1	0	0	*3*
07:45 AM	---	08:00 AM	1	0	0	0	0	1	0	0	*2*
08:00 AM	---	08:15 AM	0	0	1	0	0	0	0	0	*1*
08:15 AM	---	08:30 AM	0	0	1	2	0	3	0	0	*6*
08:30 AM	---	08:45 AM	2	2	2	0	1	1	0	0	*8*
08:45 AM	---	09:00 AM	0	0	0	0	0	1	0	0	*1*
HOURLY TOTALS											
07:00 AM	---	08:00 AM	5	1	1	0	0	2	0	0	*9*
07:15 AM	---	08:15 AM	5	1	2	0	0	2	0	0	*10*
07:30 AM	---	08:30 AM	2	1	2	2	0	5	0	0	*12*
07:45 AM	---	08:45 AM	3	2	4	2	1	5	0	0	*17*
08:00 AM	---	09:00 AM	2	2	4	2	1	5	0	0	*16*

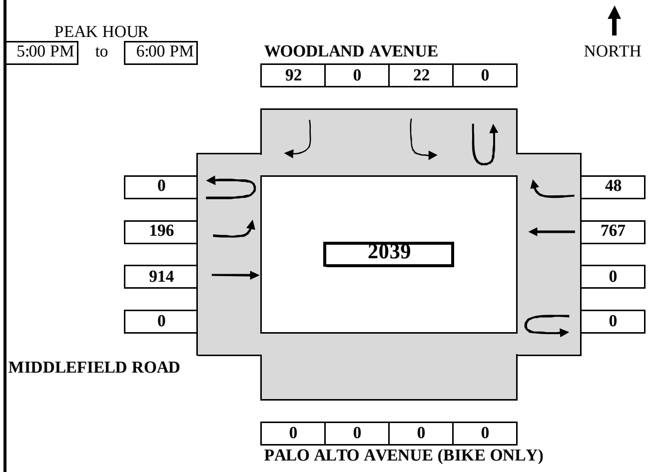
Tel : (510) 232-1271 ***Fax: (510) 232-1272***

7:45 AM to 8:45 AM					
VOLUME BY DIRECTION	NB	SB	EB	WB	TOTAL
PEDESTRIAN	2	4	8	3	17
VOLUME BY LEG	N-LEG	S-LEG	E-LEG	W-LEG	TOTAL
PEDESTRIAN	5	6	6	0	17

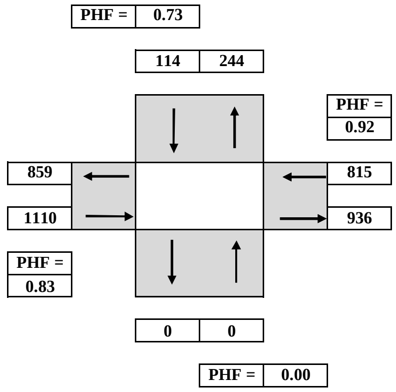
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**PALO ALTO AVENUE - WOODLAND AVENUE**	**SURVEY TIME:**	**4:00 PM**	**TO**	**6:00 PM**
E-W APPROACH:	**MIDDLEFIELD ROAD**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-3PM**



ARRIVAL / DEPARTURE VOLUMES



TIME	PERIOD		NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
4:00 PM	to	4:15 PM						6		24		46	208				131	8	**423**
4:15 PM	to	4:30 PM						8		54		101	446				278	22	**909**
4:30 PM	to	4:45 PM						12		85		154	655				412	26	**1344**
4:45 PM	to	5:00 PM						21		125		198	823				583	37	**1787**
5:00 PM	to	5:15 PM						25		142		256	1101				777	48	**2349**
5:15 PM	to	5:30 PM						30		163		299	1314				958	56	**2820**
5:30 PM	to	5:45 PM						40		192		354	1553				1161	75	**3375**
5:45 PM	to	6:00 PM						43		217		394	1737				1350	85	**3826**
TOTAL BY PERIOD																			
4:00 PM	to	4:15 PM	0	0	0	0	0	6	0	24	0	46	208	0	0	0	131	8	**423**
4:15 PM	to	4:30 PM	0	0	0	0	0	2	0	30	0	55	238	0	0	0	147	14	**486**
4:30 PM	to	4:45 PM	0	0	0	0	0	4	0	31	0	53	209	0	0	0	134	4	**435**
4:45 PM	to	5:00 PM	0	0	0	0	0	9	0	40	0	44	168	0	0	0	171	11	**443**
5:00 PM	to	5:15 PM	0	0	0	0	0	4	0	17	0	58	278	0	0	0	194	11	**562**
5:15 PM	to	5:30 PM	0	0	0	0	0	5	0	21	0	43	213	0	0	0	181	8	**471**
5:30 PM	to	5:45 PM	0	0	0	0	0	10	0	29	0	55	239	0	0	0	203	19	**555**
5:45 PM	to	6:00 PM	0	0	0	0	0	3	0	25	0	40	184	0	0	0	189	10	**451**
HOURLY TOTALS																			
4:00 PM	to	5:00 PM	0	0	0	0	0	21	0	125	0	198	823	0	0	0	583	37	**1787**
4:15 PM	to	5:15 PM	0	0	0	0	0	19	0	118	0	210	893	0	0	0	646	40	**1926**
4:30 PM	to	5:30 PM	0	0	0	0	0	22	0	109	0	198	868	0	0	0	680	34	**1911**
4:45 PM	to	5:45 PM	0	0	0	0	0	28	0	107	0	200	898	0	0	0	749	49	**2031**
5:00 PM	to	6:00 PM	0	0	0	0	0	22	0	92	0	196	914	0	0	0	767	48	**2039**

PEAK HOUR SUMMARY

5:00 PM to 6:00 PM	**NORTHBOUND**				**SOUTHBOUND**				**EASTBOUND**				**WESTBOUND**				TOTAL
	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	
VOLUME	0	0	0	0	0	22	0	92	0	196	914	0	0	0	767	48	**2039**
PHF BY MOVEMENT	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.79	0.00	0.84	0.82	0.00	0.00	0.00	0.94	0.63	OVERALL
PHF BY APPROACH	0.00				0.73				0.83				0.92				0.91
BICYCLE	7				3				9				3				**22**
PEDESTRIAN	1				3				10				4				**18**
	N-LEG				**S-LEG**				**E-LEG**				**W-LEG**				
PEDESTRIAN BY LEG:	12				2				4				0				**18**

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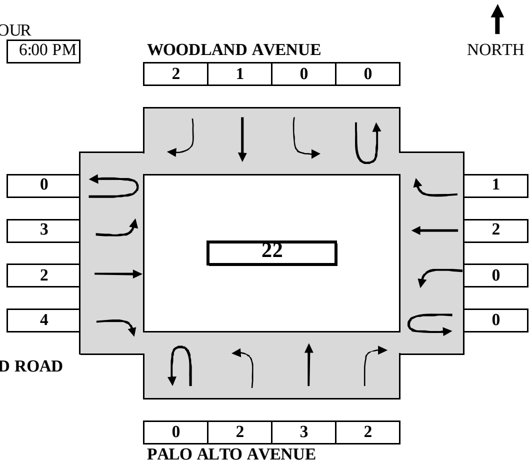
B.A.Y.M.E.T.R.I.C.S.

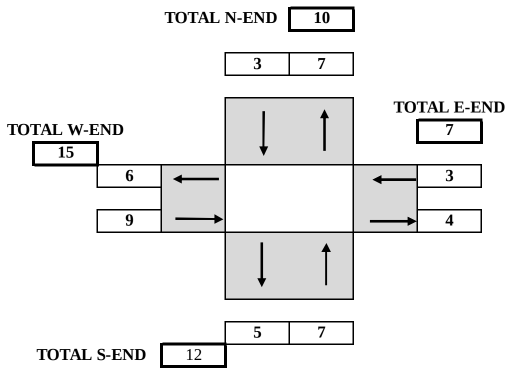
BICYCLE TURNING MOVEMENT SUMMARY

PROJECT: TRAFFIC COUNTS IN PALO ALTO **SURVEY DATE:** 5/22/2018 **DAY:** TUESDAY
N-S APPROACH: PALO ALTO AVENUE - WOODLAND AVENUE **SURVEY TIME:** 4:00 PM **TO** 6:00 PM
E-W APPROACH: MIDDLEFIELD ROAD **JURISDICTION:** PALO ALTO **FILE:** 3805030-3PM

PEAK HOUR
5:00 PM to 6:00 PM



PEAK HOUR
TOTAL BICYCLE VOLUMES
44



TIME		PERIOD	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
4:00 PM	to	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**
4:15 PM	to	4:30 PM	0	0	1	0	0	0	0	1	0	0	2	0	0	0	1	0	**5**
4:30 PM	to	4:45 PM	0	1	3	0	0	0	2	1	0	0	3	0	0	0	1	0	**11**
4:45 PM	to	5:00 PM	0	1	3	0	0	0	2	1	0	2	3	1	0	0	2	0	**15**
5:00 PM	to	5:15 PM	0	2	5	1	0	0	2	1	0	4	3	2	0	0	3	1	**24**
5:15 PM	to	5:30 PM	0	2	5	1	0	0	2	2	0	4	4	4	0	0	3	1	**28**
5:30 PM	to	5:45 PM	0	2	6	2	0	0	2	2	0	5	5	4	0	0	4	1	**33**
5:45 PM	to	6:00 PM	0	3	6	2	0	0	3	3	0	5	5	5	0	0	4	1	**37**
TOTAL BY PERIOD																			
4:00 PM	to	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**
4:15 PM	to	4:30 PM	0	0	1	0	0	0	0	1	0	0	2	0	0	0	0	0	**4**
4:30 PM	to	4:45 PM	0	1	2	0	0	0	2	0	0	0	1	0	0	0	0	0	**6**
4:45 PM	to	5:00 PM	0	0	0	0	0	0	0	0	0	2	0	1	0	0	1	0	**4**
5:00 PM	to	5:15 PM	0	1	2	1	0	0	0	0	0	2	0	1	0	0	1	1	**9**
5:15 PM	to	5:30 PM	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	**4**
5:30 PM	to	5:45 PM	0	0	1	1	0	0	0	0	0	1	1	0	0	0	1	0	**5**
5:45 PM	to	6:00 PM	0	1	0	0	0	0	1	1	0	0	0	1	0	0	0	0	**4**
HOURLY TOTALS																			
4:00 PM	to	5:00 PM	0	1	3	0	0	0	2	1	0	2	3	1	0	0	2	0	**15**
4:15 PM	to	5:15 PM	0	2	5	1	0	0	2	1	0	4	3	2	0	0	2	1	**23**
4:30 PM	to	5:30 PM	0	2	4	1	0	0	2	1	0	4	2	4	0	0	2	1	**23**
4:45 PM	to	5:45 PM	0	1	3	2	0	0	0	1	0	5	2	4	0	0	3	1	**22**
5:00 PM	to	6:00 PM	0	2	3	2	0	0	1	2	0	3	2	4	0	0	2	1	**22**

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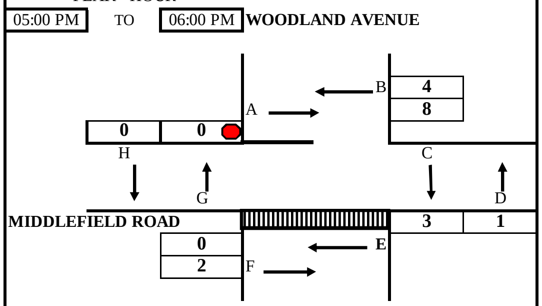
5:00 PM to 6:00 PM					
APPROACH VOLUME	NB	SB	EB	WB	TOTAL
BICYCLE	7	3	9	3	**22**

B.A.Y.M.E.T.R.I.C.S.

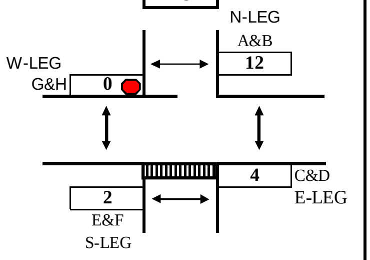
PEDESTRIAN MOVEMENT SUMMARY

PROJECT: TRAFFIC COUNTS IN PALO ALTO **SURVEY DATE:** 5/22/2018
N-S APPROACH: PALO ALTO AVENUE WOODLAND AVENUE **DAY:** TUESDAY
E-W APPROACH: MIDDLEFIELD ROAD **JURISDICTION:** PALO ALTO
SURVEY PERIOD 4:00 PM TO 6:00 PM **FILE:** 3805030-3PM

PEAK HOUR
05:00 PM TO 06:00 PM



PEAK HOUR
TOTAL PEDESTRIAN VOLUMES
18



LEGEND:
- ▥ CROSSWALK
- ▬ SIDEWALK
- — STOP CONTROL LINE
- ● STOP

BY LEG:	
N-LEG	12
S-LEG	2
E-LEG	4
W-LEG	0

BY DIRECTION:	
NB(D+G)	1
SB(C+H)	3
EB(A+F)	10
WB(B+E)	4

TIME PERIOD			**NORTH X-WALK**		**EAST X-WALK**		**SOUTH X-WALK**		**WEST X-WALK**		
From		**To**	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***TOTAL***
SURVEY DATA											
04:00 PM	---	04:15 PM	0	0	1	0	0	0	0	0	*1*
04:15 PM	---	04:30 PM	0	0	3	0	0	0	0	0	*3*
04:30 PM	---	04:45 PM	0	1	3	0	0	0	0	0	*4*
04:45 PM	---	05:00 PM	0	3	3	0	0	0	0	0	*6*
05:00 PM	---	05:15 PM	2	3	4	0	0	0	0	0	*9*
05:15 PM	---	05:30 PM	5	5	4	1	0	0	0	0	*15*
05:30 PM	---	05:45 PM	7	7	6	1	0	2	0	0	*23*
05:45 PM	---	06:00 PM	8	7	6	1	0	2	0	0	*24*
TOTAL BY PERIOD											
04:00 PM	---	04:15 PM	0	0	1	0	0	0	0	0	*1*
04:15 PM	---	04:30 PM	0	0	2	0	0	0	0	0	*2*
04:30 PM	---	04:45 PM	0	1	0	0	0	0	0	0	*1*
04:45 PM	---	05:00 PM	0	2	0	0	0	0	0	0	*2*
05:00 PM	---	05:15 PM	2	0	1	0	0	0	0	0	*3*
05:15 PM	---	05:30 PM	3	2	0	1	0	0	0	0	*6*
05:30 PM	---	05:45 PM	2	2	2	0	0	2	0	0	*8*
05:45 PM	---	06:00 PM	1	0	0	0	0	0	0	0	*1*
HOURLY TOTALS											
04:00 PM	---	05:00 PM	0	3	3	0	0	0	0	0	*6*
04:15 PM	---	05:15 PM	2	3	3	0	0	0	0	0	*8*
04:30 PM	---	05:30 PM	5	5	1	1	0	0	0	0	*12*
04:45 PM	---	05:45 PM	7	6	3	1	0	2	0	0	*19*
05:00 PM	---	06:00 PM	8	4	3	1	0	2	0	0	*18*

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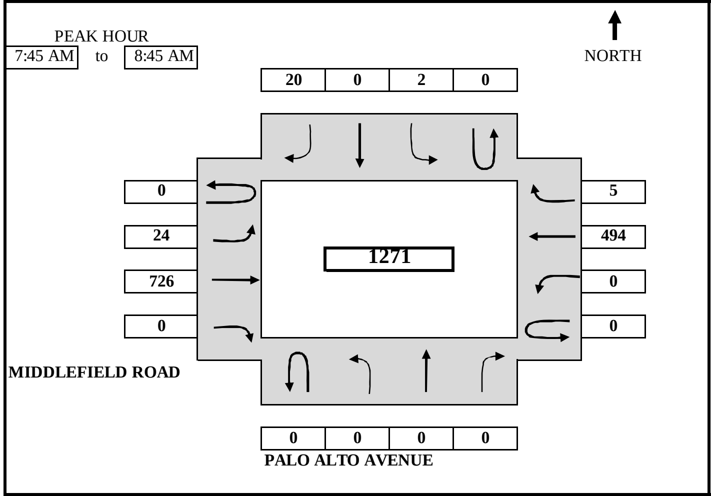
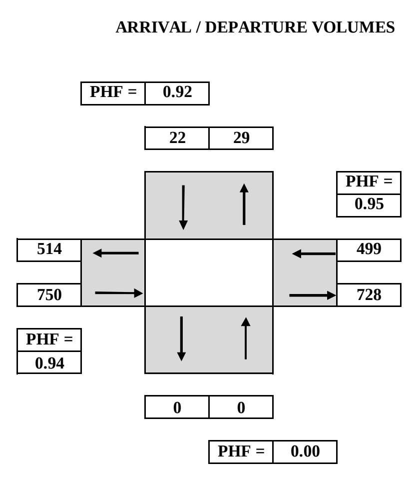
5:00 PM to 6:00 PM					
VOLUME BY DIRECTION	NB	SB	EB	WB	TOTAL
PEDESTRIAN	1	3	10	4	**18**
VOLUME BY LEG	N-LEG	S-LEG	E-LEG	W-LEG	TOTAL
PEDESTRIAN	12	2	4	0	**18**

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**PALO ALTO AVENUE**	**SURVEY TIME:**	**7:00 AM**	**TO**	**9:00 AM**
E-W APPROACH:	**MIDDLEFIELD ROAD**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-4AM**





TIME From		PERIOD To	NORTHBOUND U-TURN	LEFT	THRU	RIGHT	SOUTHBOUND U-TURN	LEFT	THRU	RIGHT	EASTBOUND U-TURN	LEFT	THRU	RIGHT	WESTBOUND U-TURN	LEFT	THRU	RIGHT	TOTAL
SURVEY DATA																			
7:00 AM	to	7:15 AM						1		1		1	150				62	0	**215**
7:15 AM	to	7:30 AM						1		2		3	274				135	2	**417**
7:30 AM	to	7:45 AM						1		7		4	445				260	2	**719**
7:45 AM	to	8:00 AM						2		12		8	622				370	4	**1018**
8:00 AM	to	8:15 AM						2		17		12	789				500	6	**1326**
8:15 AM	to	8:30 AM						2		22		19	981				625	6	**1655**
8:30 AM	to	8:45 AM						3		27		28	1171				754	7	**1990**
8:45 AM	to	9:00 AM						3		35		37	1322				866	8	**2271**
TOTAL BY PERIOD																			
7:00 AM	to	7:15 AM	0	0	0	0	0	1	0	1	0	1	150	0	0	0	62	0	**215**
7:15 AM	to	7:30 AM	0	0	0	0	0	0	0	1	0	2	124	0	0	0	73	2	**202**
7:30 AM	to	7:45 AM	0	0	0	0	0	0	0	5	0	1	171	0	0	0	125	0	**302**
7:45 AM	to	8:00 AM	0	0	0	0	0	1	0	5	0	4	177	0	0	0	110	2	**299**
8:00 AM	to	8:15 AM	0	0	0	0	0	0	0	5	0	4	167	0	0	0	130	2	**308**
8:15 AM	to	8:30 AM	0	0	0	0	0	0	0	5	0	7	192	0	0	0	125	0	**329**
8:30 AM	to	8:45 AM	0	0	0	0	0	1	0	5	0	9	190	0	0	0	129	1	**335**
8:45 AM	to	9:00 AM	0	0	0	0	0	0	0	8	0	9	151	0	0	0	112	1	**281**
HOURLY TOTALS																			
7:00 AM	to	8:00 AM	0	0	0	0	0	2	0	12	0	8	622	0	0	0	370	4	**1018**
7:15 AM	to	8:15 AM	0	0	0	0	0	1	0	16	0	11	639	0	0	0	438	6	**1111**
7:30 AM	to	8:30 AM	0	0	0	0	0	1	0	20	0	16	707	0	0	0	490	4	**1238**
7:45 AM	to	8:45 AM	0	0	0	0	0	2	0	20	0	24	726	0	0	0	494	5	**1271**
8:00 AM	to	9:00 AM	0	0	0	0	0	1	0	23	0	29	700	0	0	0	496	4	**1253**

PEAK HOUR SUMMARY

7:45 AM to 8:45 AM	**NORTHBOUND** NBU	NBL	NBT	NBR	**SOUTHBOUND** SBU	SBL	SBT	SBR	**EASTBOUND** EBU	EBL	EBT	EBR	**WESTBOUND** WBU	WBL	WBT	WBR	TOTAL
VOLUME	0	0	0	0	0	2	0	20	0	24	726	0	0	0	494	5	**1271**
PHF BY MOVEMENT	0.00	0.00	0.00	0.00	0.00	0.50	0.00	1.00	0.00	0.67	0.95	0.00	0.00	0.00	0.95	0.63	OVERALL
PHF BY APPROACH	0.00				0.92				0.94				0.95				0.95
BICYCLE	0				1				9				4				**14**
PEDESTRIAN	4				2				4				6				**16**
	N-LEG				**S-LEG**				**E-LEG**				**W-LEG**				
PEDESTRIAN BY LEG:	10				0				4				2				**16**

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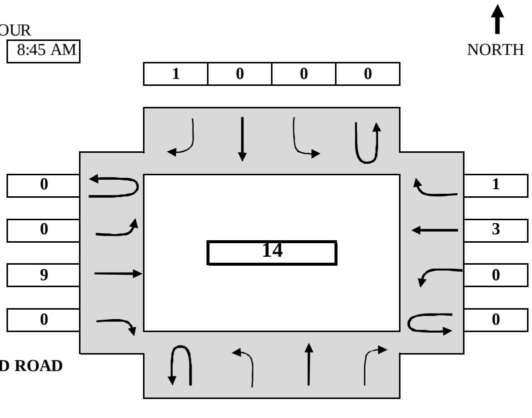
B.A.Y.M.E.T.R.I.C.S.

BICYCLE TURNING MOVEMENT SUMMARY

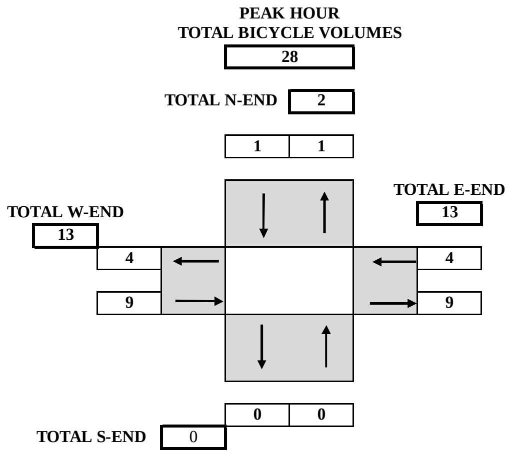
PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**PALO ALTO AVENUE**	**SURVEY TIME:**	**7:00 AM**	**TO**	**9:00 AM**
E-W APPROACH:	**MIDDLEFIELD ROAD**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-4AM**

PEAK HOUR
7:45 AM to 8:45 AM



MIDDLEFIELD ROAD

PALO ALTO AVENUE



TIME		PERIOD	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
7:00 AM	to	7:15 AM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	**3**
7:15 AM	to	7:30 AM	0	0	0	0	0	0	0	2	0	0	2	0	0	0	1	0	**5**
7:30 AM	to	7:45 AM	0	0	0	0	0	0	0	2	0	0	4	0	0	0	2	0	**8**
7:45 AM	to	8:00 AM	0	0	0	0	0	0	0	3	0	0	6	0	0	0	2	1	**12**
8:00 AM	to	8:15 AM	0	0	0	0	0	0	0	3	0	0	10	0	0	0	3	1	**17**
8:15 AM	to	8:30 AM	0	0	0	0	0	0	0	3	0	0	12	0	0	0	4	1	**20**
8:30 AM	to	8:45 AM	0	0	0	0	0	0	0	3	0	0	13	0	0	0	5	1	**22**
8:45 AM	to	9:00 AM	0	0	0	0	0	0	0	3	0	0	14	0	0	0	6	1	**24**
TOTAL BY PERIOD																			
7:00 AM	to	7:15 AM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	**3**
7:15 AM	to	7:30 AM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	**2**
7:30 AM	to	7:45 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	**3**
7:45 AM	to	8:00 AM	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	1	**4**
8:00 AM	to	8:15 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	1	0	**5**
8:15 AM	to	8:30 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	**3**
8:30 AM	to	8:45 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	**2**
8:45 AM	to	9:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	**2**
HOURLY TOTALS																			
7:00 AM	to	8:00 AM	0	0	0	0	0	0	0	3	0	0	6	0	0	0	2	1	**12**
7:15 AM	to	8:15 AM	0	0	0	0	0	0	0	2	0	0	9	0	0	0	2	1	**14**
7:30 AM	to	8:30 AM	0	0	0	0	0	0	0	1	0	0	10	0	0	0	3	1	**15**
7:45 AM	to	8:45 AM	0	0	0	0	0	0	0	1	0	0	9	0	0	0	3	1	**14**
8:00 AM	to	9:00 AM	0	0	0	0	0	0	0	0	0	0	8	0	0	0	4	0	**12**

TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

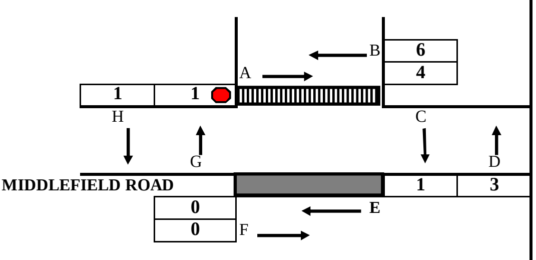
7:45 AM to 8:45 AM					
APPROACH VOLUME	NB	SB	EB	WB	TOTAL
BICYCLE	0	1	9	4	**14**

B.A.Y.M.E.T.R.I.C.S.

PEDESTRIAN MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**
N-S APPROACH:	**PALO ALTO AVENUE**	**DAY:**	**TUESDAY**
E-W APPROACH:	**MIDDLEFIELD ROAD**	**JURISDICTION:**	**PALO ALTO**
SURVEY PERIOD	**7:00 AM TO 9:00 AM**	**FILE:**	**3805030-4AM**

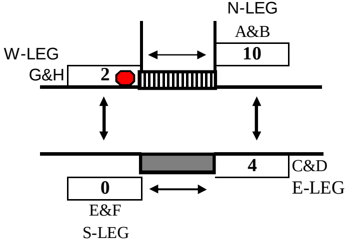
PEAK HOUR
07:45 AM TO 08:45 AM



PALO ALTO AVENUE

LEGEND:
- ▥ CROSSWALK
- ▬ SIDEWALK
- — STOP CONTROL LINE
- ● STOP

PEAK HOUR
TOTAL PEDESTRIAN VOLUMES
16



BY LEG:		**BY DIRECTION:**	
N-LEG	10	**NB**(D+G)	4
S-LEG	0	**SB**(C+H)	2
E-LEG	4	**EB**(A+F)	4
W-LEG	2	**WB**(B+E)	6

TIME PERIOD			**NORTH X-WALK**		**EAST X-WALK**		**SOUTH X-WALK**		**WEST X-WALK**		
From		**To**	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***TOTAL***
					SURVEY DATA						
07:00 AM	---	07:15 AM	0	0	0	0	0	0	0	0	*0*
07:15 AM	---	07:30 AM	1	0	0	1	0	0	0	0	*2*
07:30 AM	---	07:45 AM	3	1	0	1	0	0	0	0	*5*
07:45 AM	---	08:00 AM	3	2	0	2	0	0	0	0	*7*
08:00 AM	---	08:15 AM	4	2	1	3	0	0	0	0	*10*
08:15 AM	---	08:30 AM	5	5	1	3	0	0	1	1	*16*
08:30 AM	---	08:45 AM	7	7	1	4	0	0	1	1	*21*
08:45 AM	---	09:00 AM	8	8	1	4	0	0	1	1	*23*
					TOTAL BY PERIOD						
07:00 AM	---	07:15 AM	0	0	0	0	0	0	0	0	*0*
07:15 AM	---	07:30 AM	1	0	0	1	0	0	0	0	*2*
07:30 AM	---	07:45 AM	2	1	0	0	0	0	0	0	*3*
07:45 AM	---	08:00 AM	0	1	0	1	0	0	0	0	*2*
08:00 AM	---	08:15 AM	1	0	1	1	0	0	0	0	*3*
08:15 AM	---	08:30 AM	1	3	0	0	0	0	1	1	*6*
08:30 AM	---	08:45 AM	2	2	0	1	0	0	0	0	*5*
08:45 AM	---	09:00 AM	1	1	0	0	0	0	0	0	*2*
					HOURLY TOTALS						
07:00 AM	---	08:00 AM	3	2	0	2	0	0	0	0	*7*
07:15 AM	---	08:15 AM	4	2	1	3	0	0	0	0	*10*
07:30 AM	---	08:30 AM	4	5	1	2	0	0	1	1	*14*
07:45 AM	---	08:45 AM	4	6	1	3	0	0	1	1	*16*
08:00 AM	---	09:00 AM	5	6	1	2	0	0	1	1	*16*

Tel : (510) 232-1271 ***Fax: (510) 232-1272***

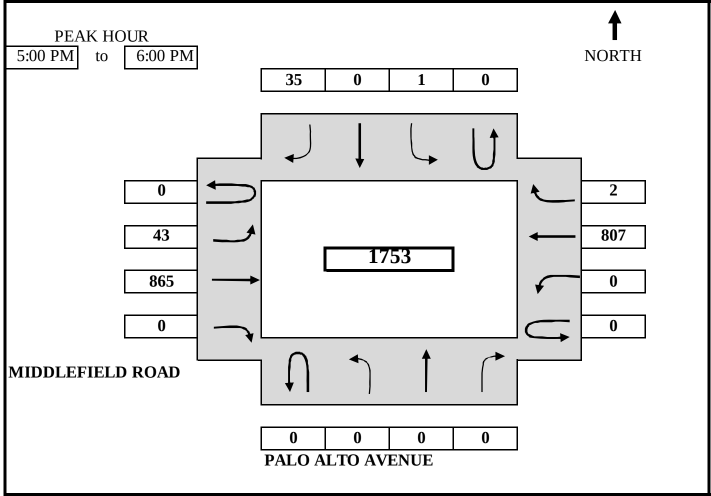
7:45 AM to 8:45 AM

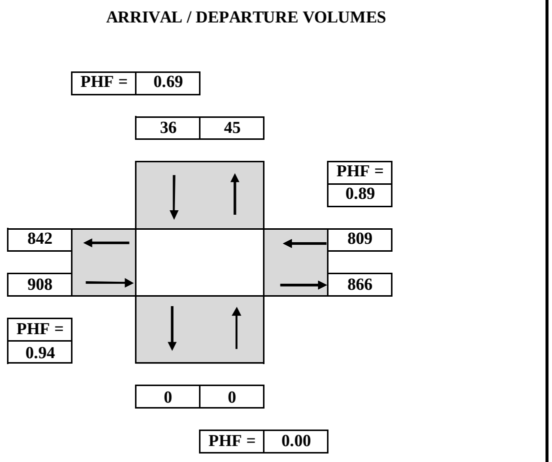
VOLUME BY DIRECTION	NB	SB	EB	WB	TOTAL
PEDESTRIAN	4	2	4	6	**16**
VOLUME BY LEG	N-LEG	S-LEG	E-LEG	W-LEG	TOTAL
PEDESTRIAN	10	0	4	2	**16**

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**PALO ALTO AVENUE**	**SURVEY TIME:**	**4:00 PM**	**TO**	**6:00 PM**
E-W APPROACH:	**MIDDLEFIELD ROAD**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-4PM**





TIME From		PERIOD To	NORTHBOUND U-TURN	NORTHBOUND LEFT	NORTHBOUND THRU	NORTHBOUND RIGHT	SOUTHBOUND U-TURN	SOUTHBOUND LEFT	SOUTHBOUND THRU	SOUTHBOUND RIGHT	EASTBOUND U-TURN	EASTBOUND LEFT	EASTBOUND THRU	EASTBOUND RIGHT	WESTBOUND U-TURN	WESTBOUND LEFT	WESTBOUND THRU	WESTBOUND RIGHT	TOTAL
SURVEY DATA																			
4:00 PM	to	4:15 PM						0		9		8	190				132	0	**339**
4:15 PM	to	4:30 PM						1		14		21	389				268	1	**694**
4:30 PM	to	4:45 PM						1		18		35	621				422	1	**1098**
4:45 PM	to	5:00 PM						1		27		47	835				603	1	**1514**
5:00 PM	to	5:15 PM						2		39		61	1013				773	3	**1891**
5:15 PM	to	5:30 PM						2		45		73	1239				975	3	**2337**
5:30 PM	to	5:45 PM						2		55		86	1468				1182	3	**2796**
5:45 PM	to	6:00 PM						2		62		90	1700				1410	3	**3267**
TOTAL BY PERIOD																			
4:00 PM	to	4:15 PM	0	0	0	0	0	0	0	9	0	8	190	0	0	0	132	0	**339**
4:15 PM	to	4:30 PM	0	0	0	0	0	1	0	5	0	13	199	0	0	0	136	1	**355**
4:30 PM	to	4:45 PM	0	0	0	0	0	0	0	4	0	14	232	0	0	0	154	0	**404**
4:45 PM	to	5:00 PM	0	0	0	0	0	0	0	9	0	12	214	0	0	0	181	0	**416**
5:00 PM	to	5:15 PM	0	0	0	0	0	1	0	12	0	14	178	0	0	0	170	2	**377**
5:15 PM	to	5:30 PM	0	0	0	0	0	0	0	6	0	12	226	0	0	0	202	0	**446**
5:30 PM	to	5:45 PM	0	0	0	0	0	0	0	10	0	13	229	0	0	0	207	0	**459**
5:45 PM	to	6:00 PM	0	0	0	0	0	0	0	7	0	4	232	0	0	0	228	0	**471**
HOURLY TOTALS																			
4:00 PM	to	5:00 PM	0	0	0	0	0	1	0	27	0	47	835	0	0	0	603	1	**1514**
4:15 PM	to	5:15 PM	0	0	0	0	0	2	0	30	0	53	823	0	0	0	641	3	**1552**
4:30 PM	to	5:30 PM	0	0	0	0	0	1	0	31	0	52	850	0	0	0	707	2	**1643**
4:45 PM	to	5:45 PM	0	0	0	0	0	1	0	37	0	51	847	0	0	0	760	2	**1698**
5:00 PM	to	6:00 PM	0	0	0	0	0	1	0	35	0	43	865	0	0	0	807	2	**1753**

PEAK HOUR SUMMARY

5:00 PM to 6:00 PM	**NORTHBOUND**				**SOUTHBOUND**				**EASTBOUND**				**WESTBOUND**				TOTAL
	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	
VOLUME	0	0	0	0	0	1	0	35	0	43	865	0	0	0	807	2	**1753**
PHF BY MOVEMENT	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.73	0.00	0.77	0.93	0.00	0.00	0.00	0.88	0.25	OVERALL
PHF BY APPROACH	0.00				0.69				0.94				0.89				0.93
BICYCLE	0				1				2				5				**8**
PEDESTRIAN	2				0				6				8				**16**
	N-LEG				**S-LEG**				**E-LEG**				**W-LEG**				
PEDESTRIAN BY LEG:	14				0				2				0				**16**

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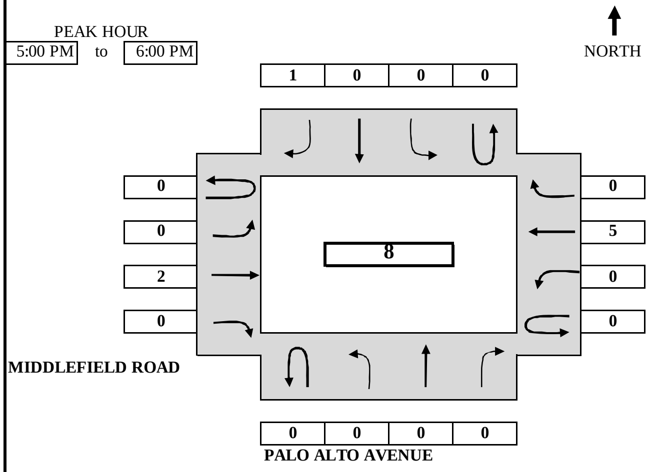
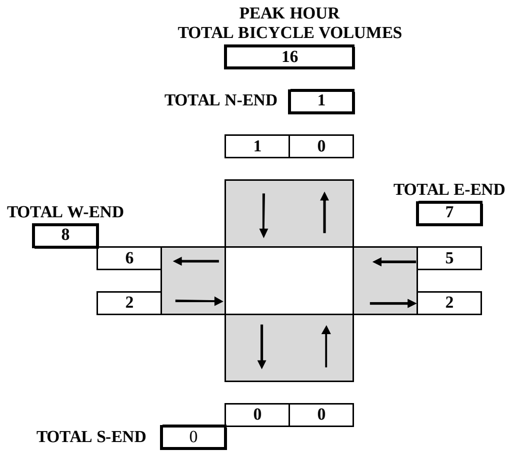
B.A.Y.M.E.T.R.I.C.S.

BICYCLE TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**PALO ALTO AVENUE**	**SURVEY TIME:**	**4:00 PM**	**TO**	**6:00 PM**
E-W APPROACH:	**MIDDLEFIELD ROAD**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-4PM**

PEAK HOUR
5:00 PM to 6:00 PM





TIME		PERIOD	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
4:00 PM	to	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**
4:15 PM	to	4:30 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	**3**
4:30 PM	to	4:45 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	**4**
4:45 PM	to	5:00 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	**6**
5:00 PM	to	5:15 PM	0	0	0	0	0	0	0	1	0	0	3	0	0	0	4	0	**8**
5:15 PM	to	5:30 PM	0	0	0	0	0	0	0	1	0	0	4	0	0	0	5	0	**10**
5:30 PM	to	5:45 PM	0	0	0	0	0	0	0	1	0	0	4	0	0	0	6	0	**11**
5:45 PM	to	6:00 PM	0	0	0	0	0	0	0	1	0	0	5	0	0	0	8	0	**14**
TOTAL BY PERIOD																			
4:00 PM	to	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**
4:15 PM	to	4:30 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	**2**
4:30 PM	to	4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**
4:45 PM	to	5:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	**2**
5:00 PM	to	5:15 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	**2**
5:15 PM	to	5:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	**2**
5:30 PM	to	5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**
5:45 PM	to	6:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	**3**
HOURLY TOTALS																			
4:00 PM	to	5:00 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	**6**
4:15 PM	to	5:15 PM	0	0	0	0	0	0	0	1	0	0	3	0	0	0	3	0	**7**
4:30 PM	to	5:30 PM	0	0	0	0	0	0	0	1	0	0	2	0	0	0	4	0	**7**
4:45 PM	to	5:45 PM	0	0	0	0	0	0	0	1	0	0	2	0	0	0	4	0	**7**
5:00 PM	to	6:00 PM	0	0	0	0	0	0	0	1	0	0	2	0	0	0	5	0	**8**

TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

5:00 PM to 6:00 PM					
APPROACH VOLUME	NB	SB	EB	WB	TOTAL
BICYCLE	0	1	2	5	**8**

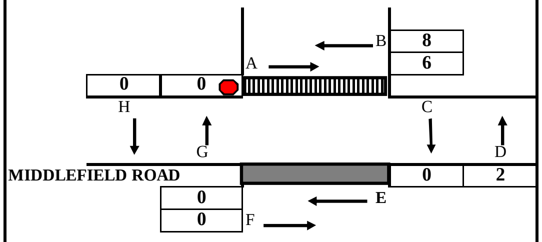
B.A.Y.M.E.T.R.I.C.S.

PEDESTRIAN MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**
N-S APPROACH:	**PALO ALTO AVENUE**	**DAY:**	**TUESDAY**
E-W APPROACH:	**MIDDLEFIELD ROAD**	**JURISDICTION:**	**PALO ALTO**
SURVEY PERIOD	**4:00 PM TO 6:00 PM**	**FILE:**	**3805030-4PM**

PEAK HOUR

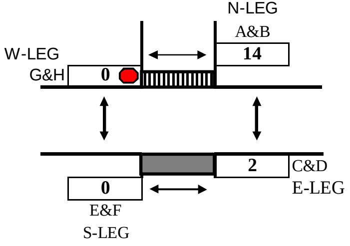
05:00 PM TO 06:00 PM



PEAK HOUR

TOTAL PEDESTRIAN VOLUMES

16



PALO ALTO AVENUE

LEGEND:

- ▥ CROSSWALK
- ▬ SIDEWALK
- — STOP CONTROL LINE
- ● STOP

BY LEG:		**BY DIRECTION:**	
N-LEG	**14**	**NB**(D+G)	**2**
S-LEG	**0**	**SB**(C+H)	**0**
E-LEG	**2**	**EB**(A+F)	**6**
W-LEG	**0**	**WB**(B+E)	**8**

TIME PERIOD			**NORTH X-WALK**		**EAST X-WALK**		**SOUTH X-WALK**		**WEST X-WALK**		
From		**To**	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***TOTAL***
					SURVEY DATA						
04:00 PM	---	04:15 PM	0	2	0	0	0	0	1	0	*3*
04:15 PM	---	04:30 PM	1	3	0	0	0	0	1	0	*5*
04:30 PM	---	04:45 PM	1	3	0	0	0	0	1	0	*5*
04:45 PM	---	05:00 PM	3	4	0	1	0	0	1	2	*11*
05:00 PM	---	05:15 PM	5	6	0	3	0	0	1	2	*17*
05:15 PM	---	05:30 PM	9	7	0	3	0	0	1	2	*22*
05:30 PM	---	05:45 PM	9	11	0	3	0	0	1	2	*26*
05:45 PM	---	06:00 PM	9	12	0	3	0	0	1	2	*27*
					TOTAL BY PERIOD						
04:00 PM	---	04:15 PM	0	2	0	0	0	0	1	0	*3*
04:15 PM	---	04:30 PM	1	1	0	0	0	0	0	0	*2*
04:30 PM	---	04:45 PM	0	0	0	0	0	0	0	0	*0*
04:45 PM	---	05:00 PM	2	1	0	1	0	0	0	2	*6*
05:00 PM	---	05:15 PM	2	2	0	2	0	0	0	0	*6*
05:15 PM	---	05:30 PM	4	1	0	0	0	0	0	0	*5*
05:30 PM	---	05:45 PM	0	4	0	0	0	0	0	0	*4*
05:45 PM	---	06:00 PM	0	1	0	0	0	0	0	0	*1*
					HOURLY TOTALS						
04:00 PM	---	05:00 PM	3	4	0	1	0	0	1	2	*11*
04:15 PM	---	05:15 PM	5	4	0	3	0	0	0	2	*14*
04:30 PM	---	05:30 PM	8	4	0	3	0	0	0	2	*17*
04:45 PM	---	05:45 PM	8	8	0	3	0	0	0	2	*21*
05:00 PM	---	06:00 PM	6	8	0	2	0	0	0	0	*16*

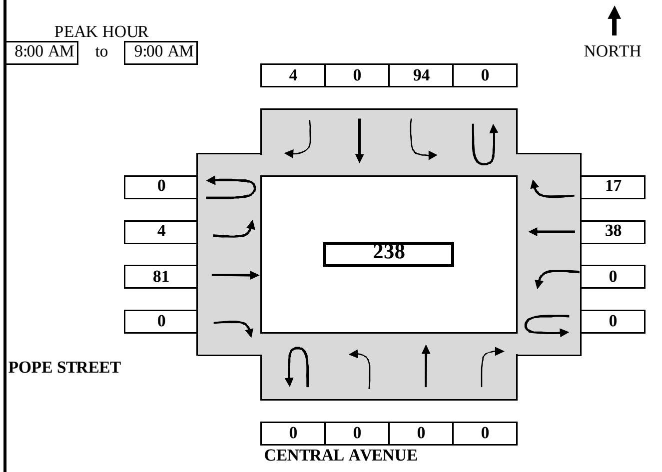
Tel : (510) 232-1271 ***Fax: (510) 232-1272***

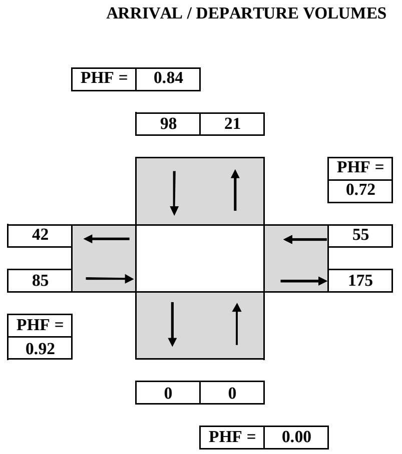
5:00 PM to 6:00 PM					
VOLUME BY DIRECTION	NB	SB	EB	WB	TOTAL
PEDESTRIAN	2	0	6	8	**16**
VOLUME BY LEG	N-LEG	S-LEG	E-LEG	W-LEG	TOTAL
PEDESTRIAN	14	0	2	0	**16**

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**CENTRAL AVENUE**	**SURVEY TIME:**	**7:00 AM**	**TO**	**9:00 AM**
E-W APPROACH:	**POPE STREET**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-5AM**





TIME		PERIOD	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
7:00 AM	to	7:15 AM						3		1		0	3				1	3	**11**
7:15 AM	to	7:30 AM						13		1		0	7				3	5	**29**
7:30 AM	to	7:45 AM						25		1		2	11				6	6	**51**
7:45 AM	to	8:00 AM						40		1		2	29				16	10	**98**
8:00 AM	to	8:15 AM						58		2		3	51				31	14	**159**
8:15 AM	to	8:30 AM						84		3		4	67				40	18	**216**
8:30 AM	to	8:45 AM						107		3		4	89				43	23	**269**
8:45 AM	to	9:00 AM						134		5		6	110				54	27	**336**
TOTAL BY PERIOD																			
7:00 AM	to	7:15 AM	0	0	0	0	0	3	0	1	0	0	3	0	0	0	1	3	**11**
7:15 AM	to	7:30 AM	0	0	0	0	0	10	0	0	0	0	4	0	0	0	2	2	**18**
7:30 AM	to	7:45 AM	0	0	0	0	0	12	0	0	0	2	4	0	0	0	3	1	**22**
7:45 AM	to	8:00 AM	0	0	0	0	0	15	0	0	0	0	18	0	0	0	10	4	**47**
8:00 AM	to	8:15 AM	0	0	0	0	0	18	0	1	0	1	22	0	0	0	15	4	**61**
8:15 AM	to	8:30 AM	0	0	0	0	0	26	0	1	0	1	16	0	0	0	9	4	**57**
8:30 AM	to	8:45 AM	0	0	0	0	0	23	0	0	0	0	22	0	0	0	3	5	**53**
8:45 AM	to	9:00 AM	0	0	0	0	0	27	0	2	0	2	21	0	0	0	11	4	**67**
HOURLY TOTALS																			
7:00 AM	to	8:00 AM	0	0	0	0	0	40	0	1	0	2	29	0	0	0	16	10	**98**
7:15 AM	to	8:15 AM	0	0	0	0	0	55	0	1	0	3	48	0	0	0	30	11	**148**
7:30 AM	to	8:30 AM	0	0	0	0	0	71	0	2	0	4	60	0	0	0	37	13	**187**
7:45 AM	to	8:45 AM	0	0	0	0	0	82	0	2	0	2	78	0	0	0	37	17	**218**
8:00 AM	to	9:00 AM	0	0	0	0	0	94	0	4	0	4	81	0	0	0	38	17	**238**

PEAK HOUR SUMMARY

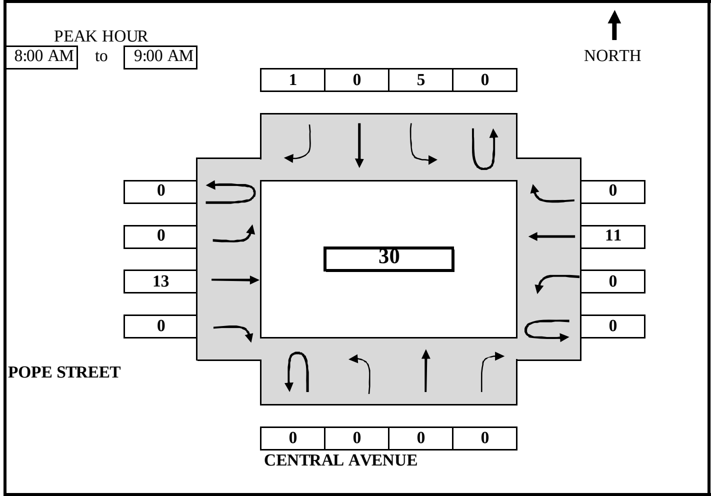
8:00 AM to 9:00 AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	
VOLUME	0	0	0	0	0	94	0	4	0	4	81	0	0	0	38	17	**238**
PHF BY MOVEMENT	0.00	0.00	0.00	0.00	0.00	0.87	0.00	0.50	0.00	0.50	0.92	0.00	0.00	0.00	0.63	0.85	OVERALL
PHF BY APPROACH	0.00				0.84				0.92				0.72				0.89
BICYCLE	0				6				13				11				**30**
PEDESTRIAN	0				0				8				0				**8**
	N-LEG				**S-LEG**				**E-LEG**				**W-LEG**				
PEDESTRIAN BY LEG:	8				0				0				0				**8**

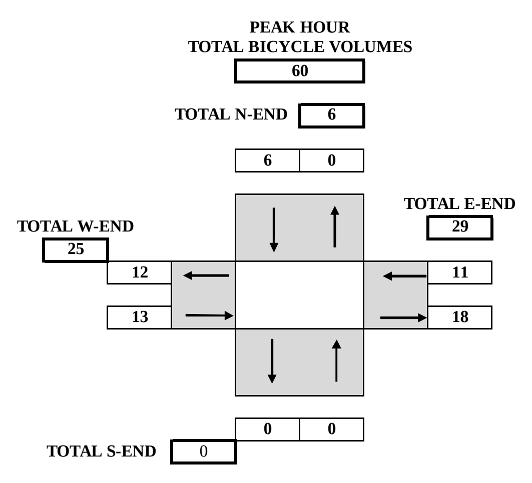
TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

B.A.Y.M.E.T.R.I.C.S.

BICYCLE TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**CENTRAL AVENUE**	**SURVEY TIME:**	**7:00 AM**	**TO**	**9:00 AM**
E-W APPROACH:	**POPE STREET**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-5AM**





TIME		**PERIOD**	**NORTHBOUND**				**SOUTHBOUND**				**EASTBOUND**				**WESTBOUND**				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
7:00 AM	to	7:15 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	**5**
7:15 AM	to	7:30 AM	0	0	0	0	0	0	0	0	0	0	10	0	0	0	1	0	**11**
7:30 AM	to	7:45 AM	0	0	0	0	0	1	0	0	0	0	13	0	0	0	3	0	**17**
7:45 AM	to	8:00 AM	0	0	0	0	0	2	0	0	0	0	15	0	0	0	3	0	**20**
8:00 AM	to	8:15 AM	0	0	0	0	0	3	0	0	0	0	19	0	0	0	6	0	**28**
8:15 AM	to	8:30 AM	0	0	0	0	0	5	0	0	0	0	21	0	0	0	9	0	**35**
8:30 AM	to	8:45 AM	0	0	0	0	0	6	0	1	0	0	26	0	0	0	10	0	**43**
8:45 AM	to	9:00 AM	0	0	0	0	0	7	0	1	0	0	28	0	0	0	14	0	**50**
TOTAL BY PERIOD																			
7:00 AM	to	7:15 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	**5**
7:15 AM	to	7:30 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	1	0	**6**
7:30 AM	to	7:45 AM	0	0	0	0	0	1	0	0	0	0	3	0	0	0	2	0	**6**
7:45 AM	to	8:00 AM	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	**3**
8:00 AM	to	8:15 AM	0	0	0	0	0	1	0	0	0	0	4	0	0	0	3	0	**8**
8:15 AM	to	8:30 AM	0	0	0	0	0	2	0	0	0	0	2	0	0	0	3	0	**7**
8:30 AM	to	8:45 AM	0	0	0	0	0	1	0	1	0	0	5	0	0	0	1	0	**8**
8:45 AM	to	9:00 AM	0	0	0	0	0	1	0	0	0	0	2	0	0	0	4	0	**7**
HOURLY TOTALS																			
7:00 AM	to	8:00 AM	0	0	0	0	0	2	0	0	0	0	15	0	0	0	3	0	**20**
7:15 AM	to	8:15 AM	0	0	0	0	0	3	0	0	0	0	14	0	0	0	6	0	**23**
7:30 AM	to	8:30 AM	0	0	0	0	0	5	0	0	0	0	11	0	0	0	8	0	**24**
7:45 AM	to	8:45 AM	0	0	0	0	0	5	0	1	0	0	13	0	0	0	7	0	**26**
8:00 AM	to	9:00 AM	0	0	0	0	0	5	0	1	0	0	13	0	0	0	11	0	**30**

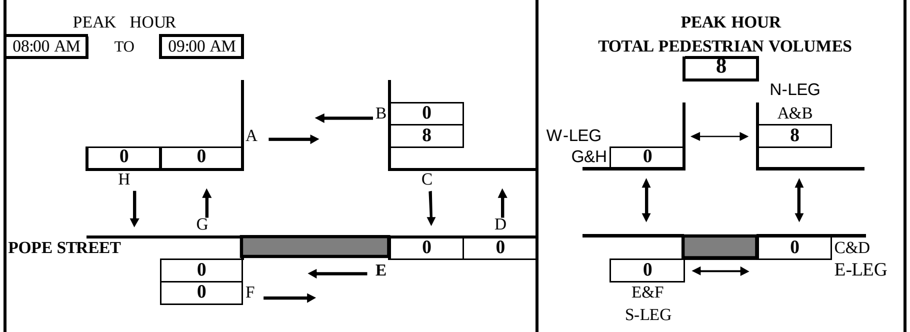
TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

8:00 AM to 9:00 AM					
APPROACH VOLUME	NB	SB	EB	WB	TOTAL
BICYCLE	0	6	13	11	**30**

B.A.Y.M.E.T.R.I.C.S.

PEDESTRIAN MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**
N-S APPROACH:	**CENTRAL AVENUE**	**DAY:**	**TUESDAY**
E-W APPROACH:	**POPE STREET**	**JURISDICTION:**	**PALO ALTO**
SURVEY PERIOD	**7:00 AM TO 9:00 AM**	**FILE:**	**3805030-5AM**



LEGEND: **CENTRAL AVENUE**

▥ CROSSWALK
▬ SIDEWALK
— STOP CONTROL LINE
● STOP

BY LEG:	
N-LEG	8
S-LEG	0
E-LEG	0
W-LEG	0

BY DIRECTION:	
NB(D+G)	0
SB(C+H)	0
EB(A+F)	8
WB(B+E)	0

TIME PERIOD			**NORTH X-WALK**		**EAST X-WALK**		**SOUTH X-WALK**		**WEST X-WALK**		
From		**To**	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***TOTAL***
SURVEY DATA											
07:00 AM	---	07:15 AM	0	1	0	0	0	0	0	0	*1*
07:15 AM	---	07:30 AM	1	1	0	0	0	0	0	0	*2*
07:30 AM	---	07:45 AM	1	1	0	0	0	0	0	0	*2*
07:45 AM	---	08:00 AM	1	2	0	0	0	0	0	0	*3*
08:00 AM	---	08:15 AM	1	2	0	0	0	0	0	0	*3*
08:15 AM	---	08:30 AM	4	2	0	0	0	0	0	0	*6*
08:30 AM	---	08:45 AM	5	2	0	0	0	0	0	0	*7*
08:45 AM	---	09:00 AM	9	2	0	0	0	0	0	0	*11*
TOTAL BY PERIOD											
07:00 AM	---	07:15 AM	0	1	0	0	0	0	0	0	*1*
07:15 AM	---	07:30 AM	1	0	0	0	0	0	0	0	*1*
07:30 AM	---	07:45 AM	0	0	0	0	0	0	0	0	*0*
07:45 AM	---	08:00 AM	0	1	0	0	0	0	0	0	*1*
08:00 AM	---	08:15 AM	0	0	0	0	0	0	0	0	*0*
08:15 AM	---	08:30 AM	3	0	0	0	0	0	0	0	*3*
08:30 AM	---	08:45 AM	1	0	0	0	0	0	0	0	*1*
08:45 AM	---	09:00 AM	4	0	0	0	0	0	0	0	*4*
HOURLY TOTALS											
07:00 AM	---	08:00 AM	1	2	0	0	0	0	0	0	*3*
07:15 AM	---	08:15 AM	1	1	0	0	0	0	0	0	*2*
07:30 AM	---	08:30 AM	3	1	0	0	0	0	0	0	*4*
07:45 AM	---	08:45 AM	4	1	0	0	0	0	0	0	*5*
08:00 AM	---	09:00 AM	8	0	0	0	0	0	0	0	*8*

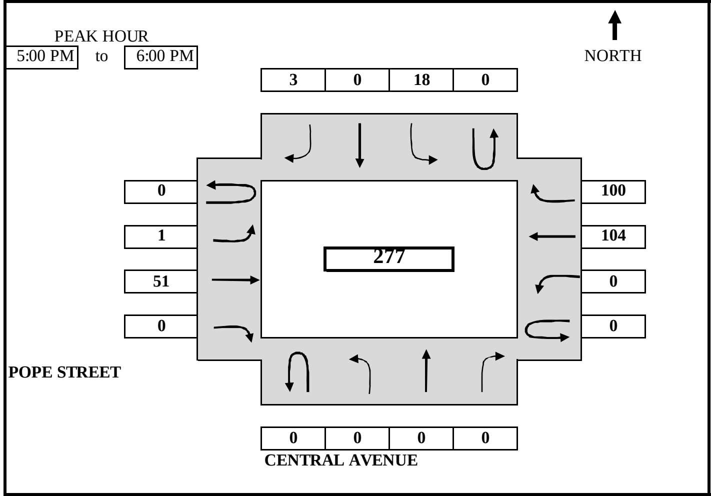
Tel : (510) 232-1271 ***Fax: (510) 232-1272***

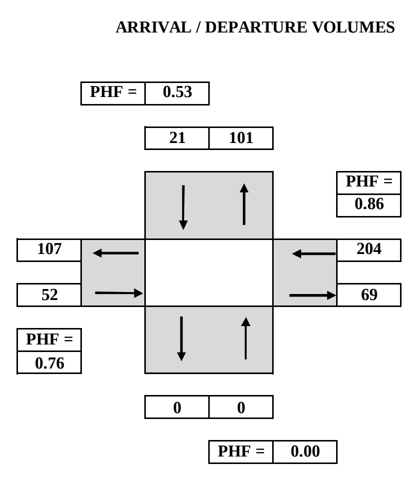
8:00 AM to 9:00 AM					
VOLUME BY DIRECTION	NB	SB	EB	WB	TOTAL
PEDESTRIAN	0	0	8	0	**8**
VOLUME BY LEG	N-LEG	S-LEG	E-LEG	W-LEG	TOTAL
PEDESTRIAN	8	0	0	0	**8**

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**CENTRAL AVENUE**	**SURVEY TIME:**	**4:00 PM**	**TO**	**6:00 PM**
E-W APPROACH:	**POPE STREET**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-5PM**





TIME		**PERIOD**	**NORTHBOUND**				**SOUTHBOUND**				**EASTBOUND**				**WESTBOUND**				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
4:00 PM	to	4:15 PM						7		0		0	22				14	16	**59**
4:15 PM	to	4:30 PM						16		0		0	37				28	38	**119**
4:30 PM	to	4:45 PM						24		1		0	47				37	50	**159**
4:45 PM	to	5:00 PM						26		2		1	58				61	66	**214**
5:00 PM	to	5:15 PM						34		4		1	70				84	102	**295**
5:15 PM	to	5:30 PM						36		5		2	76				111	123	**353**
5:30 PM	to	5:45 PM						41		5		2	92				141	150	**431**
5:45 PM	to	6:00 PM						44		5		2	109				165	166	**491**
TOTAL BY PERIOD																			
4:00 PM	to	4:15 PM	0	0	0	0	0	7	0	0	0	0	22	0	0	0	14	16	**59**
4:15 PM	to	4:30 PM	0	0	0	0	0	9	0	0	0	0	15	0	0	0	14	22	**60**
4:30 PM	to	4:45 PM	0	0	0	0	0	8	0	1	0	0	10	0	0	0	9	12	**40**
4:45 PM	to	5:00 PM	0	0	0	0	0	2	0	1	0	1	11	0	0	0	24	16	**55**
5:00 PM	to	5:15 PM	0	0	0	0	0	8	0	2	0	0	12	0	0	0	23	36	**81**
5:15 PM	to	5:30 PM	0	0	0	0	0	2	0	1	0	1	6	0	0	0	27	21	**58**
5:30 PM	to	5:45 PM	0	0	0	0	0	5	0	0	0	0	16	0	0	0	30	27	**78**
5:45 PM	to	6:00 PM	0	0	0	0	0	3	0	0	0	0	17	0	0	0	24	16	**60**
HOURLY TOTALS																			
4:00 PM	to	5:00 PM	0	0	0	0	0	26	0	2	0	1	58	0	0	0	61	66	**214**
4:15 PM	to	5:15 PM	0	0	0	0	0	27	0	4	0	1	48	0	0	0	70	86	**236**
4:30 PM	to	5:30 PM	0	0	0	0	0	20	0	5	0	2	39	0	0	0	83	85	**234**
4:45 PM	to	5:45 PM	0	0	0	0	0	17	0	4	0	2	45	0	0	0	104	100	**272**
5:00 PM	to	6:00 PM	0	0	0	0	0	18	0	3	0	1	51	0	0	0	104	100	**277**

PEAK HOUR SUMMARY

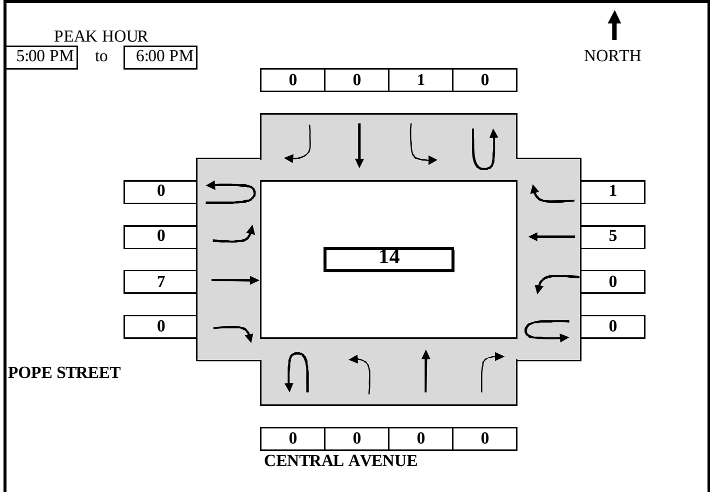
5:00 PM to 6:00 PM	**NORTHBOUND**				**SOUTHBOUND**				**EASTBOUND**				**WESTBOUND**				TOTAL
	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	
VOLUME	0	0	0	0	0	18	0	3	0	1	51	0	0	0	104	100	277
PHF BY MOVEMENT	0.00	0.00	0.00	0.00	0.00	0.56	0.00	0.38	0.00	0.25	0.75	0.00	0.00	0.00	0.87	0.69	OVERALL
PHF BY APPROACH	0.00				0.53				0.76				0.86				0.85
BICYCLE	0				1				7				6				**14**
PEDESTRIAN	0				0				2				5				**7**
	N-LEG				**S-LEG**				**E-LEG**				**W-LEG**				
PEDESTRIAN BY LEG:	7				0				0				0				**7**

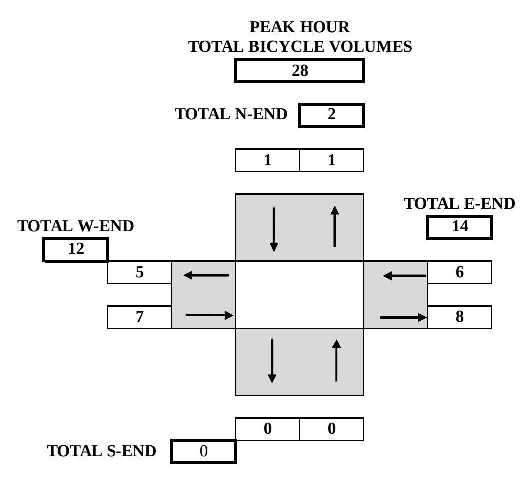
TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

B.A.Y.M.E.T.R.I.C.S.

BICYCLE TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**CENTRAL AVENUE**	**SURVEY TIME:**	**4:00 PM**	**TO**	**6:00 PM**
E-W APPROACH:	**POPE STREET**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-5PM**





TIME		PERIOD	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
4:00 PM	to	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
4:15 PM	to	4:30 PM	0	0	0	0	0	1	0	0	0	0	5	0	0	0	3	0	**9**
4:30 PM	to	4:45 PM	0	0	0	0	0	1	0	0	0	0	6	0	0	0	4	1	**12**
4:45 PM	to	5:00 PM	0	0	0	0	0	1	0	0	0	0	7	0	0	0	5	1	**14**
5:00 PM	to	5:15 PM	0	0	0	0	0	1	0	0	0	0	8	0	0	0	6	2	**17**
5:15 PM	to	5:30 PM	0	0	0	0	0	1	0	0	0	0	9	0	0	0	7	2	**19**
5:30 PM	to	5:45 PM	0	0	0	0	0	2	0	0	0	0	12	0	0	0	9	2	**25**
5:45 PM	to	6:00 PM	0	0	0	0	0	2	0	0	0	0	14	0	0	0	10	2	**28**
TOTAL BY PERIOD																			
4:00 PM	to	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
4:15 PM	to	4:30 PM	0	0	0	0	0	1	0	0	0	0	5	0	0	0	3	0	**9**
4:30 PM	to	4:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	**3**
4:45 PM	to	5:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	**2**
5:00 PM	to	5:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	**3**
5:15 PM	to	5:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	**2**
5:30 PM	to	5:45 PM	0	0	0	0	0	1	0	0	0	0	3	0	0	0	2	0	**6**
5:45 PM	to	6:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	**3**
HOURLY TOTALS																			
4:00 PM	to	5:00 PM	0	0	0	0	0	1	0	0	0	0	7	0	0	0	5	1	**14**
4:15 PM	to	5:15 PM	0	0	0	0	0	1	0	0	0	0	8	0	0	0	6	2	**17**
4:30 PM	to	5:30 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	2	**10**
4:45 PM	to	5:45 PM	0	0	0	0	0	1	0	0	0	0	6	0	0	0	5	1	**13**
5:00 PM	to	6:00 PM	0	0	0	0	0	1	0	0	0	0	7	0	0	0	5	1	**14**

TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

5:00 PM to 6:00 PM					
APPROACH VOLUME	NB	SB	EB	WB	TOTAL
BICYCLE	0	1	7	6	**14**

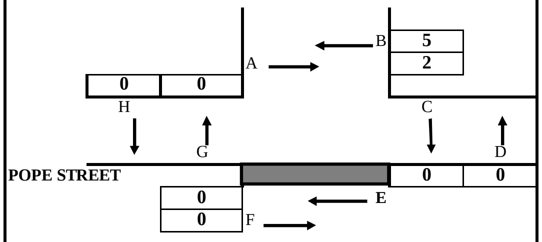
B.A.Y.M.E.T.R.I.C.S.

PEDESTRIAN MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**
N-S APPROACH:	**CENTRAL AVENUE**	**DAY:**	**TUESDAY**
E-W APPROACH:	**POPE STREET**	**JURISDICTION:**	**PALO ALTO**
SURVEY PERIOD	**4:00 PM TO 6:00 PM**	**FILE:**	**3805030-5PM**

PEAK HOUR

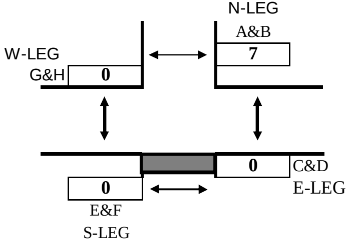
05:00 PM TO 06:00 PM



PEAK HOUR

TOTAL PEDESTRIAN VOLUMES

7



LEGEND: **CENTRAL AVENUE**

- ▥ CROSSWALK
- ▨ SIDEWALK
- — STOP CONTROL LINE
- ● STOP

BY LEG:	
N-LEG	7
S-LEG	0
E-LEG	0
W-LEG	0

BY DIRECTION:	
NB(D+G)	0
SB(C+H)	0
EB(A+F)	2
WB(B+E)	5

TIME PERIOD			**NORTH X-WALK**		**EAST X-WALK**		**SOUTH X-WALK**		**WEST X-WALK**		
From		**To**	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***TOTAL***
						SURVEY DATA					
04:00 PM	---	04:15 PM	0	0	0	0	0	0	0	0	*0*
04:15 PM	---	04:30 PM	0	0	0	0	0	0	0	0	*0*
04:30 PM	---	04:45 PM	0	1	0	0	0	0	0	0	*1*
04:45 PM	---	05:00 PM	1	1	0	0	0	0	0	0	*2*
05:00 PM	---	05:15 PM	1	3	0	0	0	0	0	0	*4*
05:15 PM	---	05:30 PM	1	4	0	0	0	0	0	0	*5*
05:30 PM	---	05:45 PM	3	5	0	0	0	0	0	0	*8*
05:45 PM	---	06:00 PM	3	6	0	0	0	0	0	0	*9*
						TOTAL BY PERIOD					
04:00 PM	---	04:15 PM	0	0	0	0	0	0	0	0	*0*
04:15 PM	---	04:30 PM	0	0	0	0	0	0	0	0	*0*
04:30 PM	---	04:45 PM	0	1	0	0	0	0	0	0	*1*
04:45 PM	---	05:00 PM	1	0	0	0	0	0	0	0	*1*
05:00 PM	---	05:15 PM	0	2	0	0	0	0	0	0	*2*
05:15 PM	---	05:30 PM	0	1	0	0	0	0	0	0	*1*
05:30 PM	---	05:45 PM	2	1	0	0	0	0	0	0	*3*
05:45 PM	---	06:00 PM	0	1	0	0	0	0	0	0	*1*
						HOURLY TOTALS					
04:00 PM	---	05:00 PM	1	1	0	0	0	0	0	0	*2*
04:15 PM	---	05:15 PM	1	3	0	0	0	0	0	0	*4*
04:30 PM	---	05:30 PM	1	4	0	0	0	0	0	0	*5*
04:45 PM	---	05:45 PM	3	4	0	0	0	0	0	0	*7*
05:00 PM	---	06:00 PM	2	5	0	0	0	0	0	0	*7*

Tel : (510) 232-1271 ***Fax: (510) 232-1272***

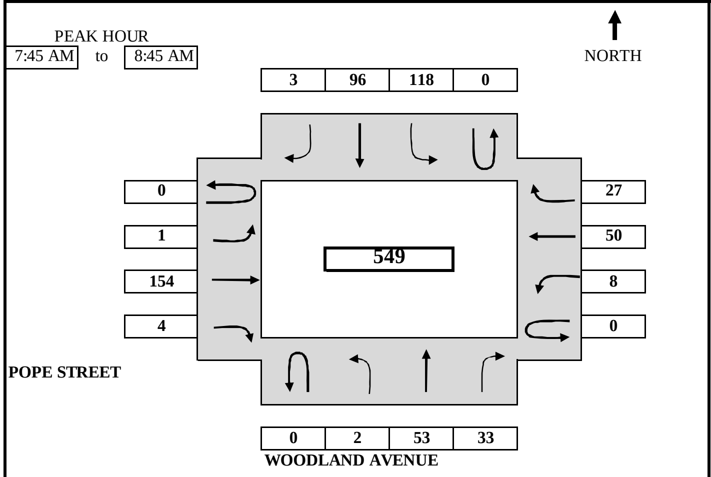
5:00 PM to 6:00 PM					
VOLUME BY DIRECTION	NB	SB	EB	WB	TOTAL
PEDESTRIAN	0	0	2	5	7
VOLUME BY LEG	N-LEG	S-LEG	E-LEG	W-LEG	TOTAL
PEDESTRIAN	7	0	0	0	7

B.A.Y.M.E.T.R.I.C.S.

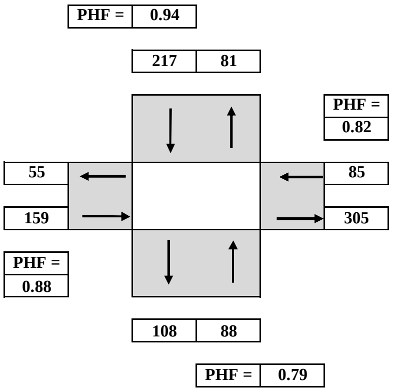
INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**WOODLAND AVENUE**	**SURVEY TIME:**	**7:00 AM**	**TO**	**9:00 AM**
E-W APPROACH:	**POPE STREET**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-6AM**

PEAK HOUR
7:45 AM to 8:45 AM



ARRIVAL / DEPARTURE VOLUMES



TIME		PERIOD	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
7:00 AM	to	7:15 AM		0	2	3		13	13	1		0	7	0		3	3	3	**48**
7:15 AM	to	7:30 AM		0	2	4		42	48	1		0	20	0		4	7	11	**139**
7:30 AM	to	7:45 AM		0	5	13		74	98	2		0	36	0		5	9	16	**258**
7:45 AM	to	8:00 AM		0	12	22		104	124	4		0	68	0		8	22	26	**390**
8:00 AM	to	8:15 AM		0	26	26		137	141	5		1	107	1		10	41	29	**524**
8:15 AM	to	8:30 AM		2	42	36		170	165	5		1	145	4		11	52	39	**672**
8:30 AM	to	8:45 AM		2	58	46		192	194	5		1	190	4		13	59	43	**807**
8:45 AM	to	9:00 AM		2	70	60		213	206	5		1	238	5		14	74	47	**935**
TOTAL BY PERIOD																			
7:00 AM	to	7:15 AM	0	0	2	3	0	13	13	1	0	0	7	0	0	3	3	3	**48**
7:15 AM	to	7:30 AM	0	0	0	1	0	29	35	0	0	0	13	0	0	1	4	8	**91**
7:30 AM	to	7:45 AM	0	0	3	9	0	32	50	1	0	0	16	0	0	1	2	5	**119**
7:45 AM	to	8:00 AM	0	0	7	9	0	30	26	2	0	0	32	0	0	3	13	10	**132**
8:00 AM	to	8:15 AM	0	0	14	4	0	33	17	1	0	1	39	1	0	2	19	3	**134**
8:15 AM	to	8:30 AM	0	2	16	10	0	33	24	0	0	0	38	3	0	1	11	10	**148**
8:30 AM	to	8:45 AM	0	0	16	10	0	22	29	0	0	0	45	0	0	2	7	4	**135**
8:45 AM	to	9:00 AM	0	0	12	14	0	21	12	0	0	0	48	1	0	1	15	4	**128**
HOURLY TOTALS																			
7:00 AM	to	8:00 AM	0	0	12	22	0	104	124	4	0	0	68	0	0	8	22	26	**390**
7:15 AM	to	8:15 AM	0	0	24	23	0	124	128	4	0	1	100	1	0	7	38	26	**476**
7:30 AM	to	8:30 AM	0	2	40	32	0	128	117	4	0	1	125	4	0	7	45	28	**533**
7:45 AM	to	8:45 AM	0	2	53	33	0	118	96	3	0	1	154	4	0	8	50	27	**549**
8:00 AM	to	9:00 AM	0	2	58	38	0	109	82	1	0	1	170	5	0	6	52	21	**545**

PEAK HOUR SUMMARY

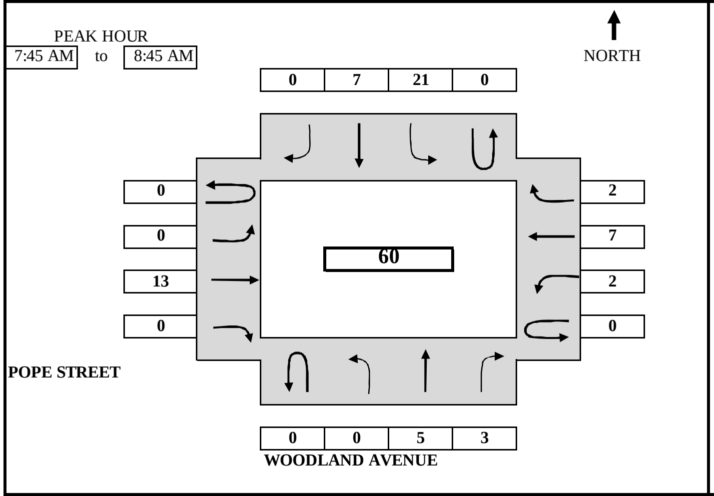
7:45 AM to 8:45 AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	
VOLUME	0	2	53	33	0	118	96	3	0	1	154	4	0	8	50	27	**549**
PHF BY MOVEMENT	0.00	0.25	0.83	0.83	0.00	0.89	0.83	0.38	0.00	0.25	0.86	0.33	0.00	0.67	0.66	0.68	OVERALL
PHF BY APPROACH	0.79				0.94				0.88				0.82				0.93
BICYCLE	8				28				13				11				**60**
PEDESTRIAN	1				2				6				2				**11**
	N-LEG				**S-LEG**				**E-LEG**				**W-LEG**				
PEDESTRIAN BY LEG:	3				5				0				3				**11**

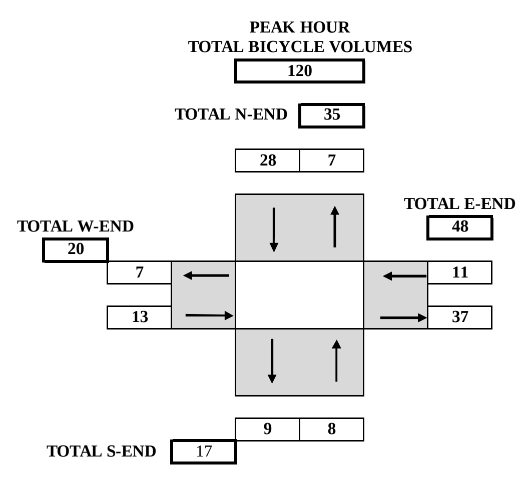
TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

B.A.Y.M.E.T.R.I.C.S.

BICYCLE TURNING MOVEMENT SUMMARY

PROJECT: TRAFFIC COUNTS IN PALO ALTO **SURVEY DATE:** 5/22/2018 **DAY:** TUESDAY
N-S APPROACH: WOODLAND AVENUE **SURVEY TIME:** 7:00 AM **TO** 9:00 AM
E-W APPROACH: POPE STREET **JURISDICTION:** PALO ALTO **FILE:** 3805030-6AM





TIME		PERIOD	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
7:00 AM	to	7:15 AM	0	0	0	1	0	3	0	0	0	0	5	0	0	0	0	0	**9**
7:15 AM	to	7:30 AM	0	0	0	2	0	6	0	0	0	0	10	0	0	0	1	0	**19**
7:30 AM	to	7:45 AM	0	0	0	3	0	8	2	0	0	0	12	1	0	3	3	1	**33**
7:45 AM	to	8:00 AM	0	0	1	3	0	11	6	0	0	0	14	1	0	4	3	1	**44**
8:00 AM	to	8:15 AM	0	0	3	4	0	18	6	0	0	0	18	1	0	4	6	2	**62**
8:15 AM	to	8:30 AM	0	0	4	4	0	20	8	0	0	0	20	1	0	4	9	2	**72**
8:30 AM	to	8:45 AM	0	0	5	6	0	29	9	0	0	0	25	1	0	5	10	3	**93**
8:45 AM	to	9:00 AM	0	0	6	8	0	38	9	0	0	0	27	1	0	7	14	5	**115**
TOTAL BY PERIOD																			
7:00 AM	to	7:15 AM	0	0	0	1	0	3	0	0	0	0	5	0	0	0	0	0	**9**
7:15 AM	to	7:30 AM	0	0	0	1	0	3	0	0	0	0	5	0	0	0	1	0	**10**
7:30 AM	to	7:45 AM	0	0	0	1	0	2	2	0	0	0	2	1	0	3	2	1	**14**
7:45 AM	to	8:00 AM	0	0	1	0	0	3	4	0	0	0	2	0	0	1	0	0	**11**
8:00 AM	to	8:15 AM	0	0	2	1	0	7	0	0	0	0	4	0	0	0	3	1	**18**
8:15 AM	to	8:30 AM	0	0	1	0	0	2	2	0	0	0	2	0	0	0	3	0	**10**
8:30 AM	to	8:45 AM	0	0	1	2	0	9	1	0	0	0	5	0	0	1	1	1	**21**
8:45 AM	to	9:00 AM	0	0	1	2	0	9	0	0	0	0	2	0	0	2	4	2	**22**
HOURLY TOTALS																			
7:00 AM	to	8:00 AM	0	0	1	3	0	11	6	0	0	0	14	1	0	4	3	1	**44**
7:15 AM	to	8:15 AM	0	0	3	3	0	15	6	0	0	0	13	1	0	4	6	2	**53**
7:30 AM	to	8:30 AM	0	0	4	2	0	14	8	0	0	0	10	1	0	4	8	2	**53**
7:45 AM	to	8:45 AM	0	0	5	3	0	21	7	0	0	0	13	0	0	2	7	2	**60**
8:00 AM	to	9:00 AM	0	0	5	5	0	27	3	0	0	0	13	0	0	3	11	4	**71**

TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

7:45 AM to 8:45 AM					
APPROACH VOLUME	NB	SB	EB	WB	TOTAL
BICYCLE	8	28	13	11	**60**

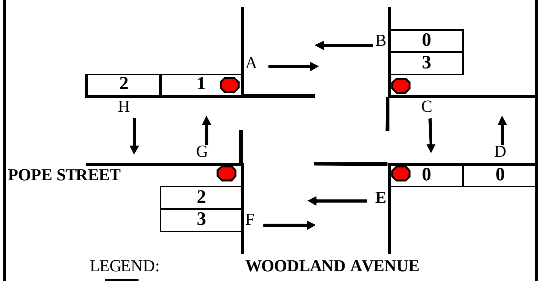
B.A.Y.M.E.T.R.I.C.S.

PEDESTRIAN MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**
N-S APPROACH:	**WOODLAND AVENUE**	**DAY:**	**TUESDAY**
E-W APPROACH:	**POPE STREET**	**JURISDICTION:**	**PALO ALTO**
SURVEY PERIOD	**7:00 AM TO 9:00 AM**	**FILE:**	**3805030-6AM**

PEAK HOUR

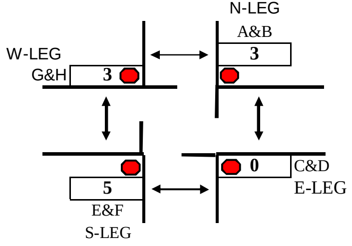
07:45 AM TO 08:45 AM



PEAK HOUR

TOTAL PEDESTRIAN VOLUMES

11



LEGEND:

- ▥ CROSSWALK
- ▬ SIDEWALK
- — STOP CONTROL LINE
- ● STOP

BY LEG:		**BY DIRECTION:**	
N-LEG	3	**NB**(D+G)	1
S-LEG	5	**SB**(C+H)	2
E-LEG	0	**EB**(A+F)	6
W-LEG	3	**WB**(B+E)	2

TIME PERIOD			**NORTH X-WALK**		**EAST X-WALK**		**SOUTH X-WALK**		**WEST X-WALK**		
From		**To**	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***TOTAL***
SURVEY DATA											
07:00 AM	---	07:15 AM	0	1	0	0	0	2	0	3	*6*
07:15 AM	---	07:30 AM	1	3	0	0	0	2	1	4	*11*
07:30 AM	---	07:45 AM	2	4	0	0	0	4	2	4	*16*
07:45 AM	---	08:00 AM	2	4	0	0	0	4	2	4	*16*
08:00 AM	---	08:15 AM	4	4	0	0	0	5	2	4	*19*
08:15 AM	---	08:30 AM	4	4	0	0	1	6	3	6	*24*
08:30 AM	---	08:45 AM	5	4	0	0	2	7	3	6	*27*
08:45 AM	---	09:00 AM	7	5	0	0	4	7	4	7	*34*
TOTAL BY PERIOD											
07:00 AM	---	07:15 AM	0	1	0	0	0	2	0	3	*6*
07:15 AM	---	07:30 AM	1	2	0	0	0	0	1	1	*5*
07:30 AM	---	07:45 AM	1	1	0	0	0	2	1	0	*5*
07:45 AM	---	08:00 AM	0	0	0	0	0	0	0	0	*0*
08:00 AM	---	08:15 AM	2	0	0	0	0	1	0	0	*3*
08:15 AM	---	08:30 AM	0	0	0	0	1	1	1	2	*5*
08:30 AM	---	08:45 AM	1	0	0	0	1	1	0	0	*3*
08:45 AM	---	09:00 AM	2	1	0	0	2	0	1	1	*7*
HOURLY TOTALS											
07:00 AM	---	08:00 AM	2	4	0	0	0	4	2	4	*16*
07:15 AM	---	08:15 AM	4	3	0	0	0	3	2	1	*13*
07:30 AM	---	08:30 AM	3	1	0	0	1	4	2	2	*13*
07:45 AM	---	08:45 AM	3	0	0	0	2	3	1	2	*11*
08:00 AM	---	09:00 AM	5	1	0	0	4	3	2	3	*18*

Tel : (510) 232-1271 ***Fax: (510) 232-1272***

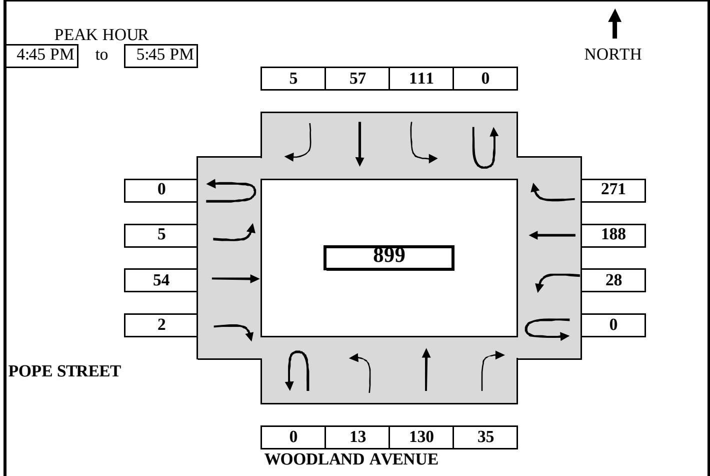
7:45 AM to 8:45 AM

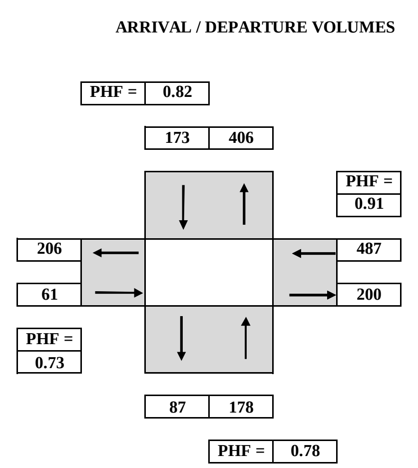
VOLUME BY DIRECTION	NB	SB	EB	WB	TOTAL
PEDESTRIAN	1	2	6	2	11
VOLUME BY LEG	N-LEG	S-LEG	E-LEG	W-LEG	TOTAL
PEDESTRIAN	3	5	0	3	11

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**WOODLAND AVENUE**	**SURVEY TIME:**	**4:00 PM**	**TO**	**6:00 PM**
E-W APPROACH:	**POPE STREET**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-6PM**





TIME		PERIOD	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
4:00 PM	to	4:15 PM		5	42	12		25	7	1		0	27	3		3	25	44	**194**
4:15 PM	to	4:30 PM		10	80	17		59	22	1		0	50	3		8	56	91	**397**
4:30 PM	to	4:45 PM		13	121	35		80	36	2		0	68	3		14	72	139	**583**
4:45 PM	to	5:00 PM		14	149	51		104	60	4		0	81	3		18	110	197	**791**
5:00 PM	to	5:15 PM		24	186	61		123	68	4		2	99	4		26	159	274	**1030**
5:15 PM	to	5:30 PM		24	221	65		152	80	6		3	103	5		34	205	342	**1240**
5:30 PM	to	5:45 PM		26	251	70		191	93	7		5	122	5		42	260	410	**1482**
5:45 PM	to	6:00 PM		28	278	78		217	105	7		6	141	6		50	297	457	**1670**
TOTAL BY PERIOD																			
4:00 PM	to	4:15 PM	0	5	42	12	0	25	7	1	0	0	27	3	0	3	25	44	**194**
4:15 PM	to	4:30 PM	0	5	38	5	0	34	15	0	0	0	23	0	0	5	31	47	**203**
4:30 PM	to	4:45 PM	0	3	41	18	0	21	14	1	0	0	18	0	0	6	16	48	**186**
4:45 PM	to	5:00 PM	0	1	28	16	0	24	24	2	0	0	13	0	0	4	38	58	**208**
5:00 PM	to	5:15 PM	0	10	37	10	0	19	8	0	0	2	18	1	0	8	49	77	**239**
5:15 PM	to	5:30 PM	0	0	35	4	0	29	12	2	0	1	4	1	0	8	46	68	**210**
5:30 PM	to	5:45 PM	0	2	30	5	0	39	13	1	0	2	19	0	0	8	55	68	**242**
5:45 PM	to	6:00 PM	0	2	27	8	0	26	12	0	0	1	19	1	0	8	37	47	**188**
HOURLY TOTALS																			
4:00 PM	to	5:00 PM	0	14	149	51	0	104	60	4	0	0	81	3	0	18	110	197	**791**
4:15 PM	to	5:15 PM	0	19	144	49	0	98	61	3	0	2	72	1	0	23	134	230	**836**
4:30 PM	to	5:30 PM	0	14	141	48	0	93	58	5	0	3	53	2	0	26	149	251	**843**
4:45 PM	to	5:45 PM	0	13	130	35	0	111	57	5	0	5	54	2	0	28	188	271	**899**
5:00 PM	to	6:00 PM	0	14	129	27	0	113	45	3	0	6	60	3	0	32	187	260	**879**

PEAK HOUR SUMMARY

4:45 PM to 5:45 PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	
VOLUME	0	13	130	35	0	111	57	5	0	5	54	2	0	28	188	271	**899**
PHF BY MOVEMENT	0.00	0.33	0.88	0.55	0.00	0.71	0.59	0.63	0.00	0.63	0.71	0.50	0.00	0.88	0.85	0.88	OVERALL
PHF BY APPROACH	0.78				0.82				0.73				0.91				0.93
BICYCLE	5				7				6				16				**34**
PEDESTRIAN	6				3				17				8				**34**
	N-LEG				**S-LEG**				**E-LEG**				**W-LEG**				
PEDESTRIAN BY LEG:	11				14				1				8				**34**

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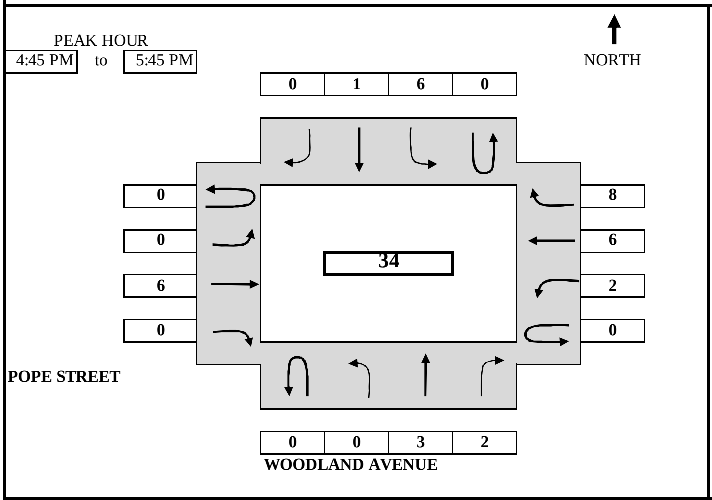
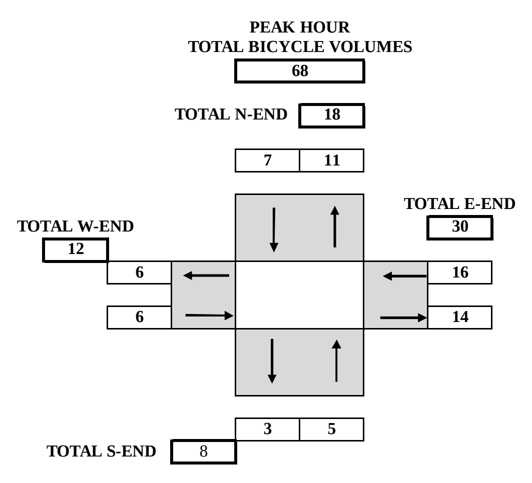
B.A.Y.M.E.T.R.I.C.S.

BICYCLE TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**WOODLAND AVENUE**	**SURVEY TIME:**	**4:00 PM**	**TO**	**6:00 PM**
E-W APPROACH:	**POPE STREET**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-6PM**





TIME		**PERIOD**	**NORTHBOUND**				**SOUTHBOUND**				**EASTBOUND**				**WESTBOUND**				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
4:00 PM	to	4:15 PM	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	1	**4**
4:15 PM	to	4:30 PM	0	0	3	0	0	1	1	0	0	0	5	0	0	0	3	3	**16**
4:30 PM	to	4:45 PM	0	0	4	0	0	3	1	0	0	0	6	0	0	0	5	4	**23**
4:45 PM	to	5:00 PM	0	0	4	1	0	7	2	0	0	0	7	0	0	1	6	5	**33**
5:00 PM	to	5:15 PM	0	0	4	1	0	7	2	0	0	0	8	0	0	2	8	7	**39**
5:15 PM	to	5:30 PM	0	0	7	2	0	8	2	0	0	0	9	0	0	2	9	10	**49**
5:30 PM	to	5:45 PM	0	0	7	2	0	9	2	0	0	0	12	0	0	2	11	12	**57**
5:45 PM	to	6:00 PM	0	0	7	2	0	10	2	0	0	0	13	1	0	4	12	17	**68**
TOTAL BY PERIOD																			
4:00 PM	to	4:15 PM	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	1	**4**
4:15 PM	to	4:30 PM	0	0	0	0	0	1	1	0	0	0	5	0	0	0	3	2	**12**
4:30 PM	to	4:45 PM	0	0	1	0	0	2	0	0	0	0	1	0	0	0	2	1	**7**
4:45 PM	to	5:00 PM	0	0	0	1	0	4	1	0	0	0	1	0	0	1	1	1	**10**
5:00 PM	to	5:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	2	**6**
5:15 PM	to	5:30 PM	0	0	3	1	0	1	0	0	0	0	1	0	0	0	1	3	**10**
5:30 PM	to	5:45 PM	0	0	0	0	0	1	0	0	0	0	3	0	0	0	2	2	**8**
5:45 PM	to	6:00 PM	0	0	0	0	0	1	0	0	0	0	1	1	0	2	1	5	**11**
HOURLY TOTALS																			
4:00 PM	to	5:00 PM	0	0	4	1	0	7	2	0	0	0	7	0	0	1	6	5	**33**
4:15 PM	to	5:15 PM	0	0	1	1	0	7	2	0	0	0	8	0	0	2	8	6	**35**
4:30 PM	to	5:30 PM	0	0	4	2	0	7	1	0	0	0	4	0	0	2	6	7	**33**
4:45 PM	to	5:45 PM	0	0	3	2	0	6	1	0	0	0	6	0	0	2	6	8	**34**
5:00 PM	to	6:00 PM	0	0	3	1	0	3	0	0	0	0	6	1	0	3	6	12	**35**

TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

4:45 PM to 5:45 PM					
APPROACH VOLUME	NB	SB	EB	WB	TOTAL
BICYCLE	5	7	6	16	**34**

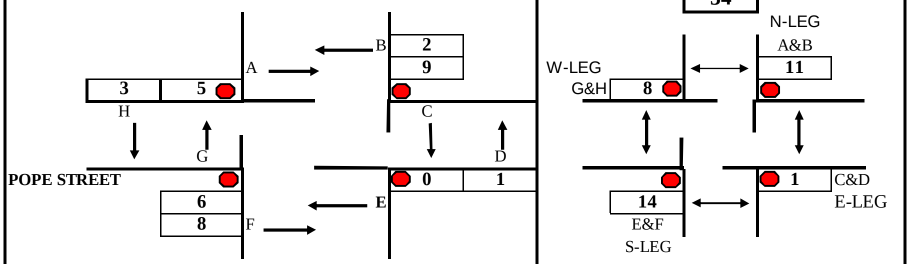
B.A.Y.M.E.T.R.I.C.S.

PEDESTRIAN MOVEMENT SUMMARY

PROJECT: TRAFFIC COUNTS IN PALO ALTO **SURVEY DATE:** 5/22/2018
N-S APPROACH: WOODLAND AVENUE **DAY:** TUESDAY
E-W APPROACH: POPE STREET **JURISDICTION:** PALO ALTO
SURVEY PERIOD 4:00 PM **TO** 6:00 PM **FILE:** 3805030-6PM

PEAK HOUR
04:45 PM TO 05:45 PM

PEAK HOUR
TOTAL PEDESTRIAN VOLUMES
34



LEGEND:
▥ CROSSWALK
▬ SIDEWALK
— STOP CONTROL LINE
● STOP

WOODLAND AVENUE

BY LEG:

N-LEG	11
S-LEG	14
E-LEG	1
W-LEG	8

BY DIRECTION:

NB(D+G)	6
SB(C+H)	3
EB(A+F)	17
WB(B+E)	8

TIME PERIOD			**NORTH X-WALK**		**EAST X-WALK**		**SOUTH X-WALK**		**WEST X-WALK**		
From		**To**	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***TOTAL***
SURVEY DATA											
04:00 PM	---	04:15 PM	2	0	0	0	1	0	1	0	***4***
04:15 PM	---	04:30 PM	4	1	2	0	2	3	4	5	***21***
04:30 PM	---	04:45 PM	5	1	2	0	3	3	4	6	***24***
04:45 PM	---	05:00 PM	6	1	2	0	7	6	5	7	***34***
05:00 PM	---	05:15 PM	7	2	2	0	7	8	7	7	***40***
05:15 PM	---	05:30 PM	9	2	2	1	7	11	7	8	***47***
05:30 PM	---	05:45 PM	14	3	2	1	9	11	9	9	***58***
05:45 PM	---	06:00 PM	14	3	2	1	13	11	11	9	***64***
TOTAL BY PERIOD											
04:00 PM	---	04:15 PM	2	0	0	0	1	0	1	0	***4***
04:15 PM	---	04:30 PM	2	1	2	0	1	3	3	5	***17***
04:30 PM	---	04:45 PM	1	0	0	0	1	0	0	1	***3***
04:45 PM	---	05:00 PM	1	0	0	0	4	3	1	1	***10***
05:00 PM	---	05:15 PM	1	1	0	0	0	2	2	0	***6***
05:15 PM	---	05:30 PM	2	0	0	1	0	3	0	1	***7***
05:30 PM	---	05:45 PM	5	1	0	0	2	0	2	1	***11***
05:45 PM	---	06:00 PM	0	0	0	0	4	0	2	0	***6***
HOURLY TOTALS											
04:00 PM	---	05:00 PM	6	1	2	0	7	6	5	7	***34***
04:15 PM	---	05:15 PM	5	2	2	0	6	8	6	7	***36***
04:30 PM	---	05:30 PM	5	1	0	1	5	8	3	3	***26***
04:45 PM	---	05:45 PM	9	2	0	1	6	8	5	3	***34***
05:00 PM	---	06:00 PM	8	2	0	1	6	5	6	2	***30***

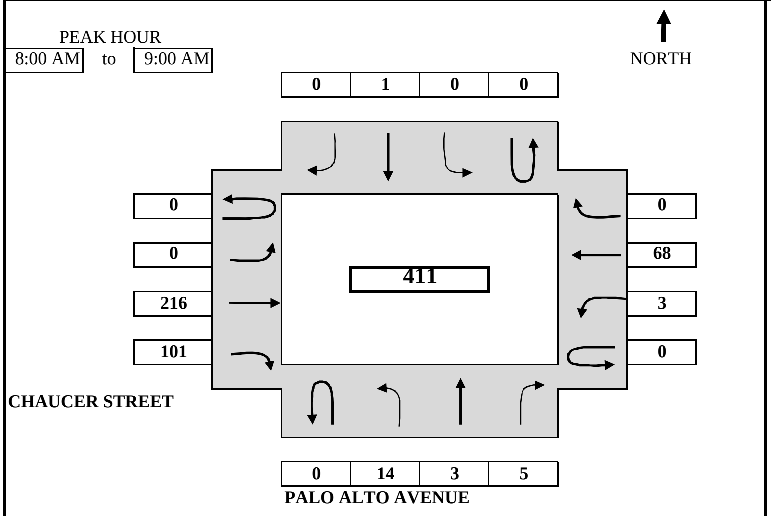
Tel : (510) 232-1271 ***Fax: (510) 232-1272***

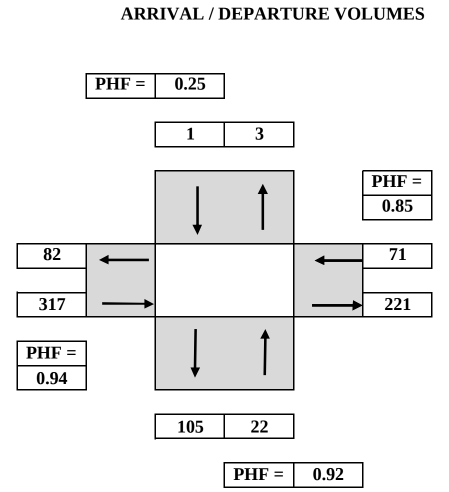
4:45 PM to 5:45 PM					
VOLUME BY DIRECTION	NB	SB	EB	WB	TOTAL
PEDESTRIAN	6	3	17	8	34
VOLUME BY LEG	N-LEG	S-LEG	E-LEG	W-LEG	TOTAL
PEDESTRIAN	11	14	1	8	34

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT: TRAFFIC COUNTS IN PALO ALTO **SURVEY DATE:** 5/22/2018 **DAY:** TUESDAY
N-S APPROACH: PALO ALTO AVENUE **SURVEY TIME:** 7:00 AM **TO** 9:00 AM
E-W APPROACH: CHAUCER STREET **JURISDICTION:** PALO ALTO **FILE:** 3805030-7AM





TIME		PERIOD	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
7:00 AM	to	7:15 AM		2	0	1		0	1	0		0	13	9		1	7	0	34
7:15 AM	to	7:30 AM		3	1	2		0	3	1		0	32	36		2	18	0	98
7:30 AM	to	7:45 AM		6	4	3		0	3	2		1	59	67		3	26	0	174
7:45 AM	to	8:00 AM		13	5	4		2	5	2		1	100	95		3	40	1	271
8:00 AM	to	8:15 AM		16	5	7		2	5	2		1	154	125		3	61	1	382
8:15 AM	to	8:30 AM		21	5	8		2	5	2		1	203	151		5	79	1	483
8:30 AM	to	8:45 AM		23	6	9		2	5	2		1	261	173		6	90	1	579
8:45 AM	to	9:00 AM		27	8	9		2	6	2		1	316	196		6	108	1	682
TOTAL BY PERIOD																			
7:00 AM	to	7:15 AM	0	2	0	1	0	0	1	0	0	0	13	9	0	1	7	0	34
7:15 AM	to	7:30 AM	0	1	1	1	0	0	2	1	0	0	19	27	0	1	11	0	64
7:30 AM	to	7:45 AM	0	3	3	1	0	0	0	1	0	1	27	31	0	1	8	0	76
7:45 AM	to	8:00 AM	0	7	1	1	0	2	2	0	0	0	41	28	0	0	14	1	97
8:00 AM	to	8:15 AM	0	3	0	3	0	0	0	0	0	0	54	30	0	0	21	0	111
8:15 AM	to	8:30 AM	0	5	0	1	0	0	0	0	0	0	49	26	0	2	18	0	101
8:30 AM	to	8:45 AM	0	2	1	1	0	0	0	0	0	0	58	22	0	1	11	0	96
8:45 AM	to	9:00 AM	0	4	2	0	0	0	1	0	0	0	55	23	0	0	18	0	103
HOURLY TOTALS																			
7:00 AM	to	8:00 AM	0	13	5	4	0	2	5	2	0	1	100	95	0	3	40	1	271
7:15 AM	to	8:15 AM	0	14	5	6	0	2	4	2	0	1	141	116	0	2	54	1	348
7:30 AM	to	8:30 AM	0	18	4	6	0	2	2	1	0	1	171	115	0	3	61	1	385
7:45 AM	to	8:45 AM	0	17	2	6	0	2	2	0	0	0	202	106	0	3	64	1	405
8:00 AM	to	9:00 AM	0	14	3	5	0	0	1	0	0	0	216	101	0	3	68	0	411

PEAK HOUR SUMMARY

8:00 AM to 9:00 AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	
VOLUME	0	14	3	5	0	0	1	0	0	0	216	101	0	3	68	0	411
PHF BY MOVEMENT	0.00	0.70	0.38	0.42	0.00	0.00	0.25	0.00	0.00	0.00	0.93	0.84	0.00	0.38	0.81	0.00	OVERALL
PHF BY APPROACH	0.92				0.25				0.94				0.85				0.93
BICYCLE	6				2				44				15				67
PEDESTRIAN	3				2				7				3				15
	N-LEG				S-LEG				E-LEG				W-LEG				
PEDESTRIAN BY LEG:	8				2				3				2				15

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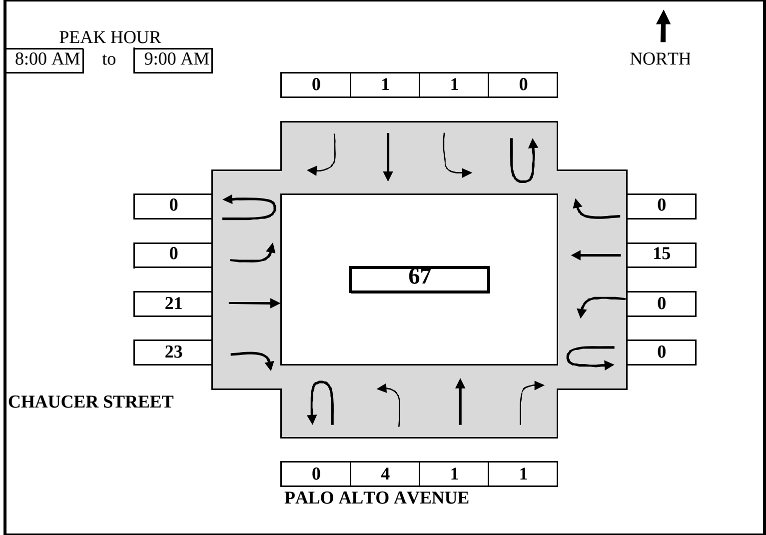
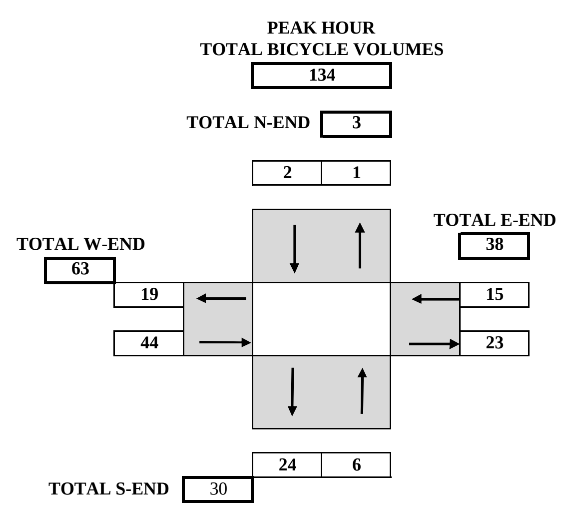
B.A.Y.M.E.T.R.I.C.S.

BICYCLE TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**PALO ALTO AVENUE**	**SURVEY TIME:**	**7:00 AM**	**TO**	**9:00 AM**
E-W APPROACH:	**CHAUCER STREET**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-7AM**





TIME		**PERIOD**	**NORTHBOUND**				**SOUTHBOUND**				**EASTBOUND**				**WESTBOUND**				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
7:00 AM	to	7:15 AM	0	0	0	0	0	0	0	0	0	0	4	3	0	0	0	0	**7**
7:15 AM	to	7:30 AM	0	0	0	0	0	0	0	0	0	0	8	9	0	0	1	0	**18**
7:30 AM	to	7:45 AM	0	1	0	0	0	0	0	0	0	0	11	12	0	0	5	0	**29**
7:45 AM	to	8:00 AM	0	1	0	0	0	0	0	0	0	0	13	15	0	0	6	0	**35**
8:00 AM	to	8:15 AM	0	1	0	0	0	1	0	0	0	0	16	25	0	0	10	0	**53**
8:15 AM	to	8:30 AM	0	2	0	0	0	1	0	0	0	0	21	29	0	0	14	0	**67**
8:30 AM	to	8:45 AM	0	2	0	0	0	1	0	0	0	0	28	35	0	0	17	0	**83**
8:45 AM	to	9:00 AM	0	5	1	1	0	1	1	0	0	0	34	38	0	0	21	0	**102**
TOTAL BY PERIOD																			
7:00 AM	to	7:15 AM	0	0	0	0	0	0	0	0	0	0	4	3	0	0	0	0	**7**
7:15 AM	to	7:30 AM	0	0	0	0	0	0	0	0	0	0	4	6	0	0	1	0	**11**
7:30 AM	to	7:45 AM	0	1	0	0	0	0	0	0	0	0	3	3	0	0	4	0	**11**
7:45 AM	to	8:00 AM	0	0	0	0	0	0	0	0	0	0	2	3	0	0	1	0	**6**
8:00 AM	to	8:15 AM	0	0	0	0	0	1	0	0	0	0	3	10	0	0	4	0	**18**
8:15 AM	to	8:30 AM	0	1	0	0	0	0	0	0	0	0	5	4	0	0	4	0	**14**
8:30 AM	to	8:45 AM	0	0	0	0	0	0	0	0	0	0	7	6	0	0	3	0	**16**
8:45 AM	to	9:00 AM	0	3	1	1	0	0	1	0	0	0	6	3	0	0	4	0	**19**
HOURLY TOTALS																			
7:00 AM	to	8:00 AM	0	1	0	0	0	0	0	0	0	0	13	15	0	0	6	0	**35**
7:15 AM	to	8:15 AM	0	1	0	0	0	1	0	0	0	0	12	22	0	0	10	0	**46**
7:30 AM	to	8:30 AM	0	2	0	0	0	1	0	0	0	0	13	20	0	0	13	0	**49**
7:45 AM	to	8:45 AM	0	1	0	0	0	1	0	0	0	0	17	23	0	0	12	0	**54**
8:00 AM	to	9:00 AM	0	4	1	1	0	1	1	0	0	0	21	23	0	0	15	0	**67**

TEL: (510) 232 - 1271 FAX: (510) 232 - 127

8:00 AM to 9:00 AM					
APPROACH VOLUME	NB	SB	EB	WB	TOTAL
BICYCLE	6	2	44	15	**67**

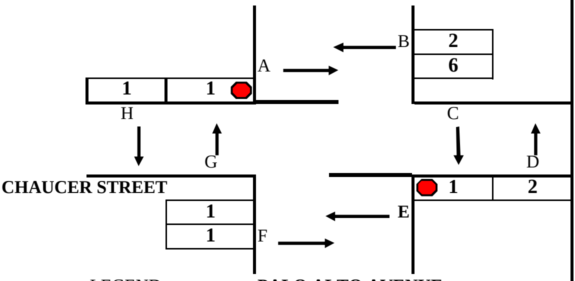
B.A.Y.M.E.T.R.I.C.S.

PEDESTRIAN MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**
N-S APPROACH:	**PALO ALTO AVENUE**	**DAY:**	**TUESDAY**
E-W APPROACH:	**CHAUCER STREET**	**JURISDICTION:**	**PALO ALTO**
SURVEY PERIOD	**7:00 AM TO 9:00 AM**	**FILE:**	**3805030-7AM**

PEAK HOUR

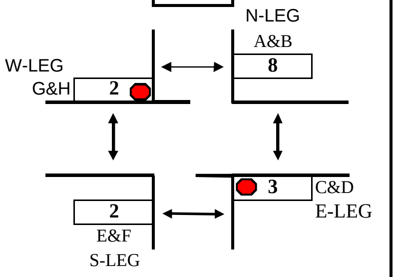
08:00 AM TO 09:00 AM



PEAK HOUR

TOTAL PEDESTRIAN VOLUMES

15



PALO ALTO AVENUE

LEGEND:

- ▥ CROSSWALK
- ▬ SIDEWALK
- — STOP CONTROL LINE
- ● STOP

BY LEG:

N-LEG	**8**
S-LEG	**2**
E-LEG	**3**
W-LEG	**2**

BY DIRECTION:

NB(D+G)	**3**
SB(C+H)	**2**
EB(A+F)	**7**
WB(B+E)	**3**

TIME PERIOD			**NORTH X-WALK**		**EAST X-WALK**		**SOUTH X-WALK**		**WEST X-WALK**		
From		**To**	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***TOTAL***
SURVEY DATA											
07:00 AM	---	07:15 AM	1	2	0	0	0	0	0	1	***4***
07:15 AM	---	07:30 AM	2	5	0	0	0	0	1	1	***9***
07:30 AM	---	07:45 AM	4	7	1	0	1	1	2	1	***17***
07:45 AM	---	08:00 AM	5	8	1	1	1	1	2	1	***20***
08:00 AM	---	08:15 AM	6	8	1	1	1	2	2	2	***23***
08:15 AM	---	08:30 AM	6	8	1	1	2	2	2	2	***24***
08:30 AM	---	08:45 AM	8	8	2	2	2	2	2	2	***28***
08:45 AM	---	09:00 AM	11	10	2	3	2	2	3	2	***35***
TOTAL BY PERIOD											
07:00 AM	---	07:15 AM	1	2	0	0	0	0	0	1	***4***
07:15 AM	---	07:30 AM	1	3	0	0	0	0	1	0	***5***
07:30 AM	---	07:45 AM	2	2	1	0	1	1	1	0	***8***
07:45 AM	---	08:00 AM	1	1	0	1	0	0	0	0	***3***
08:00 AM	---	08:15 AM	1	0	0	0	0	1	0	1	***3***
08:15 AM	---	08:30 AM	0	0	0	0	1	0	0	0	***1***
08:30 AM	---	08:45 AM	2	0	1	1	0	0	0	0	***4***
08:45 AM	---	09:00 AM	3	2	0	1	0	0	1	0	***7***
HOURLY TOTALS											
07:00 AM	---	08:00 AM	5	8	1	1	1	1	2	1	***20***
07:15 AM	---	08:15 AM	5	6	1	1	1	2	2	1	***19***
07:30 AM	---	08:30 AM	4	3	1	1	2	2	1	1	***15***
07:45 AM	---	08:45 AM	4	1	1	2	1	1	0	1	***11***
08:00 AM	---	09:00 AM	6	2	1	2	1	1	1	1	***15***

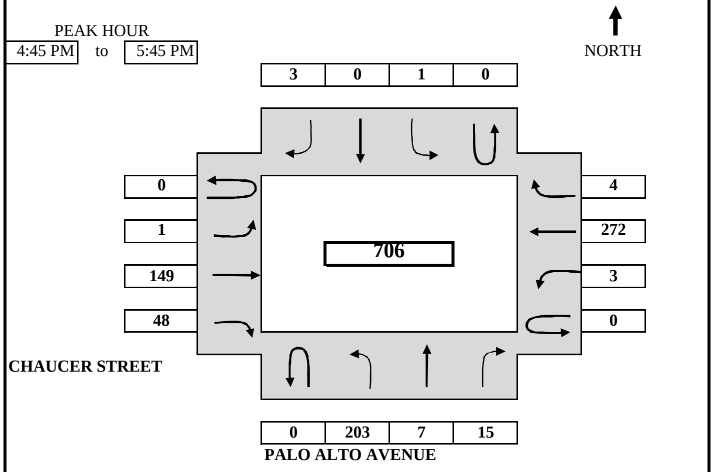
Tel : (510) 232-1271 ***Fax: (510) 232-1272***

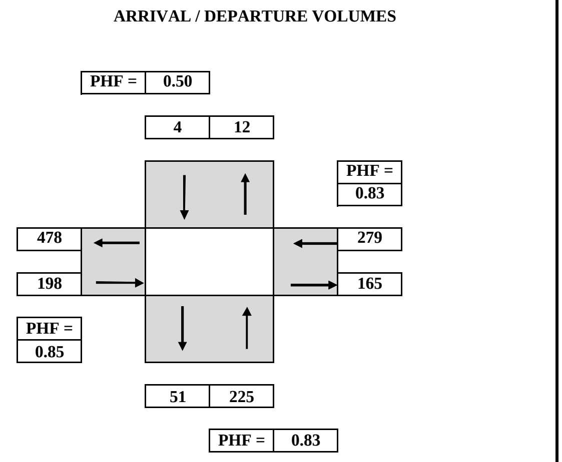
8:00 AM to 9:00 AM					
VOLUME BY DIRECTION	NB	SB	EB	WB	TOTAL
PEDESTRIAN	3	2	7	3	**15**
VOLUME BY LEG	N-LEG	S-LEG	E-LEG	W-LEG	TOTAL
PEDESTRIAN	8	2	3	2	**15**

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**PALO ALTO AVENUE**	**SURVEY TIME:**	**4:00 PM**	**TO**	**6:00 PM**
E-W APPROACH:	**CHAUCER STREET**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-7PM**





TIME		**PERIOD**	**NORTHBOUND**				**SOUTHBOUND**				**EASTBOUND**				**WESTBOUND**				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
4:00 PM	to	4:15 PM		36	1	3		1	1	1		1	53	11	1	0	38	0	**147**
4:15 PM	to	4:30 PM		63	4	5		1	2	5		1	90	33	1	0	86	1	**292**
4:30 PM	to	4:45 PM		96	5	8		4	2	9		2	129	47	1	2	125	2	**432**
4:45 PM	to	5:00 PM		138	6	11		5	2	9		2	171	61	1	3	187	2	**598**
5:00 PM	to	5:15 PM		192	7	16		5	2	10		2	207	67	1	3	261	3	**776**
5:15 PM	to	5:30 PM		254	10	19		5	2	10		3	237	78	1	4	316	4	**943**
5:30 PM	to	5:45 PM		299	12	23		5	2	12		3	278	95	1	5	397	6	**1138**
5:45 PM	to	6:00 PM		342	13	26		6	2	14		5	315	112	1	6	448	10	**1300**
TOTAL BY PERIOD																			
4:00 PM	to	4:15 PM	0	36	1	3	0	1	1	1	0	1	53	11	1	0	38	0	**147**
4:15 PM	to	4:30 PM	0	27	3	2	0	0	1	4	0	0	37	22	0	0	48	1	**145**
4:30 PM	to	4:45 PM	0	33	1	3	0	3	0	4	0	1	39	14	0	2	39	1	**140**
4:45 PM	to	5:00 PM	0	42	1	3	0	1	0	0	0	0	42	14	0	1	62	0	**166**
5:00 PM	to	5:15 PM	0	54	1	5	0	0	0	1	0	0	36	6	0	0	74	1	**178**
5:15 PM	to	5:30 PM	0	62	3	3	0	0	0	0	0	1	30	11	0	1	55	1	**167**
5:30 PM	to	5:45 PM	0	45	2	4	0	0	0	2	0	0	41	17	0	1	81	2	**195**
5:45 PM	to	6:00 PM	0	43	1	3	0	1	0	2	0	2	37	17	0	1	51	4	**162**
HOURLY TOTALS																			
4:00 PM	to	5:00 PM	0	138	6	11	0	5	2	9	0	2	171	61	1	3	187	2	**598**
4:15 PM	to	5:15 PM	0	156	6	13	0	4	1	9	0	1	154	56	0	3	223	3	**629**
4:30 PM	to	5:30 PM	0	191	6	14	0	4	0	5	0	2	147	45	0	4	230	3	**651**
4:45 PM	to	5:45 PM	0	203	7	15	0	1	0	3	0	1	149	48	0	3	272	4	**706**
5:00 PM	to	6:00 PM	0	204	7	15	0	1	0	5	0	3	144	51	0	3	261	8	**702**

PEAK HOUR SUMMARY

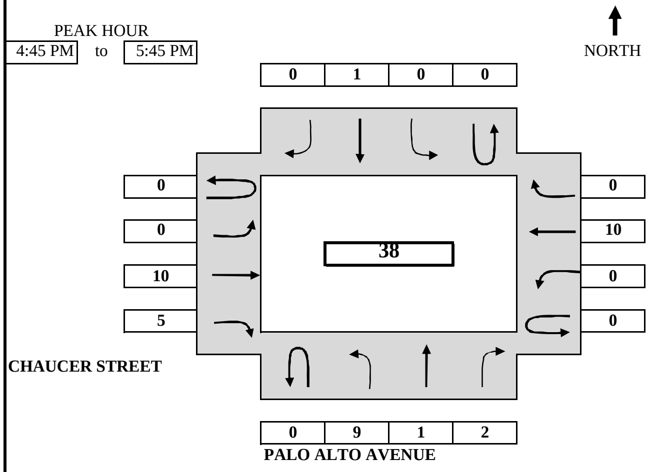
4:45 PM to 5:45 PM	**NORTHBOUND**				**SOUTHBOUND**				**EASTBOUND**				**WESTBOUND**				TOTAL
	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	
VOLUME	0	203	7	15	0	1	0	3	0	1	149	48	0	3	272	4	**706**
PHF BY MOVEMENT	0.00	0.82	0.58	0.75	0.00	0.25	0.00	0.38	0.00	0.25	0.89	0.71	0.00	0.75	0.84	0.50	OVERALL
PHF BY APPROACH	0.83				0.50				0.85				0.83				0.91
BICYCLE	12				1				15				10				**38**
PEDESTRIAN	9				6				23				13				**51**
	N-LEG				**S-LEG**				**E-LEG**				**W-LEG**				
PEDESTRIAN BY LEG:	20				16				12				3				**51**

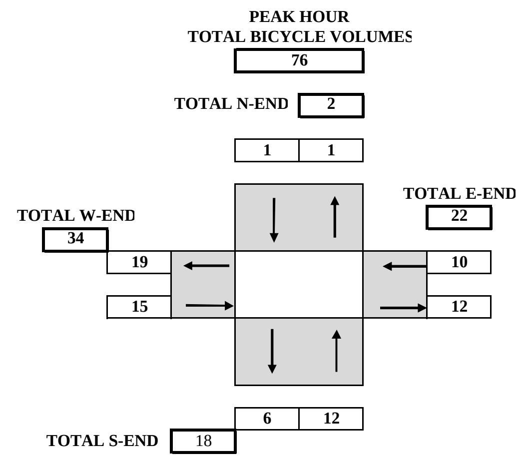
TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

B.A.Y.M.E.T.R.I.C.S.

BICYCLE TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**PALO ALTO AVENUE**	**SURVEY TIME:**	**4:00 PM**	**TO**	**6:00 PM**
E-W APPROACH:	**CHAUCER STREET**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-7PM**





TIME		PERIOD	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
4:00 PM	to	4:15 PM	0	1	0	0	0	0	0	0	0	0	1	0	0	0	5	0	**7**
4:15 PM	to	4:30 PM	0	3	0	0	0	0	0	0	0	0	6	2	0	0	7	0	**18**
4:30 PM	to	4:45 PM	0	5	0	0	0	0	0	0	0	0	7	3	0	0	8	0	**23**
4:45 PM	to	5:00 PM	0	7	0	1	0	0	0	0	0	0	12	5	0	0	11	0	**36**
5:00 PM	to	5:15 PM	0	9	1	2	0	0	1	0	0	0	13	5	0	0	13	0	**44**
5:15 PM	to	5:30 PM	0	11	1	2	0	0	1	0	0	0	16	6	0	0	15	0	**52**
5:30 PM	to	5:45 PM	0	14	1	2	0	0	1	0	0	0	17	8	0	0	18	0	**61**
5:45 PM	to	6:00 PM	0	17	1	2	0	0	1	1	0	0	19	8	0	0	23	0	**72**
TOTAL BY PERIOD																			
4:00 PM	to	4:15 PM	0	1	0	0	0	0	0	0	0	0	1	0	0	0	5	0	**7**
4:15 PM	to	4:30 PM	0	2	0	0	0	0	0	0	0	0	5	2	0	0	2	0	**11**
4:30 PM	to	4:45 PM	0	2	0	0	0	0	0	0	0	0	1	1	0	0	1	0	**5**
4:45 PM	to	5:00 PM	0	2	0	1	0	0	0	0	0	0	5	2	0	0	3	0	**13**
5:00 PM	to	5:15 PM	0	2	1	1	0	0	1	0	0	0	1	0	0	0	2	0	**8**
5:15 PM	to	5:30 PM	0	2	0	0	0	0	0	0	0	0	3	1	0	0	2	0	**8**
5:30 PM	to	5:45 PM	0	3	0	0	0	0	0	0	0	0	1	2	0	0	3	0	**9**
5:45 PM	to	6:00 PM	0	3	0	0	0	0	0	1	0	0	2	0	0	0	5	0	**11**
HOURLY TOTALS																			
4:00 PM	to	5:00 PM	0	7	0	1	0	0	0	0	0	0	12	5	0	0	11	0	**36**
4:15 PM	to	5:15 PM	0	8	1	2	0	0	1	0	0	0	12	5	0	0	8	0	**37**
4:30 PM	to	5:30 PM	0	8	1	2	0	0	1	0	0	0	10	4	0	0	8	0	**34**
4:45 PM	to	5:45 PM	0	9	1	2	0	0	1	0	0	0	10	5	0	0	10	0	**38**
5:00 PM	to	6:00 PM	0	10	1	1	0	0	1	1	0	0	7	3	0	0	12	0	**36**

TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

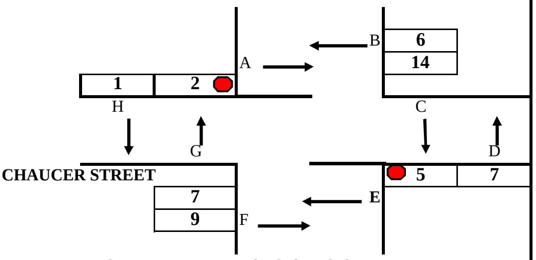
4:45 PM to 5:45 PM					
APPROACH VOLUME	NB	SB	EB	WB	TOTAL
BICYCLE	12	1	15	10	**38**

B.A.Y.M.E.T.R.I.C.S.

PEDESTRIAN MOVEMENT SUMMARY

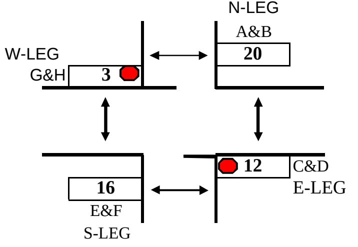
PROJECT: TRAFFIC COUNTS IN PALO ALTO — **SURVEY DATE:** 5/22/2018
N-S APPROACH: PALO ALTO AVENUE — **DAY:** TUESDAY
E-W APPROACH: CHAUCER STREET — **JURISDICTION:** PALO ALTO
SURVEY PERIOD 4:00 PM **TO** 6:00 PM — **FILE:** 3805030-7PM

PEAK HOUR
04:45 PM TO 05:45 PM



PALO ALTO AVENUE

PEAK HOUR
TOTAL PEDESTRIAN VOLUMES
51



LEGEND:
▥ CROSSWALK
▬ SIDEWALK
— STOP CONTROL LINE
🛑 STOP

BY LEG:		**BY DIRECTION:**	
N-LEG	20	**NB**(D+G)	9
S-LEG	16	**SB**(C+H)	6
E-LEG	12	**EB**(A+F)	23
W-LEG	3	**WB**(B+E)	13

TIME PERIOD			**NORTH X-WALK**		**EAST X-WALK**		**SOUTH X-WALK**		**WEST X-WALK**		
From		**To**	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***TOTAL***
SURVEY DATA											
04:00 PM	---	04:15 PM	1	0	0	1	1	0	1	1	***5***
04:15 PM	---	04:30 PM	1	1	0	2	2	5	1	3	***15***
04:30 PM	---	04:45 PM	2	3	1	4	3	5	1	3	***22***
04:45 PM	---	05:00 PM	5	5	1	5	6	7	1	3	***33***
05:00 PM	---	05:15 PM	7	7	1	8	6	8	1	3	***41***
05:15 PM	---	05:30 PM	12	7	3	9	7	11	1	3	***53***
05:30 PM	---	05:45 PM	16	9	6	11	10	14	3	4	***73***
05:45 PM	---	06:00 PM	16	9	6	11	12	14	3	4	***75***
TOTAL BY PERIOD											
04:00 PM	---	04:15 PM	1	0	0	1	1	0	1	1	***5***
04:15 PM	---	04:30 PM	0	1	0	1	1	5	0	2	***10***
04:30 PM	---	04:45 PM	1	2	1	2	1	0	0	0	***7***
04:45 PM	---	05:00 PM	3	2	0	1	3	2	0	0	***11***
05:00 PM	---	05:15 PM	2	2	0	3	0	1	0	0	***8***
05:15 PM	---	05:30 PM	5	0	2	1	1	3	0	0	***12***
05:30 PM	---	05:45 PM	4	2	3	2	3	3	2	1	***20***
05:45 PM	---	06:00 PM	0	0	0	0	2	0	0	0	***2***
HOURLY TOTALS											
04:00 PM	---	05:00 PM	5	5	1	5	6	7	1	3	***33***
04:15 PM	---	05:15 PM	6	7	1	7	5	8	0	2	***36***
04:30 PM	---	05:30 PM	11	6	3	7	5	6	0	0	***38***
04:45 PM	---	05:45 PM	14	6	5	7	7	9	2	1	***51***
05:00 PM	---	06:00 PM	11	4	5	6	6	7	2	1	***42***

Tel : (510) 232-1271 ***Fax: (510) 232-1272***

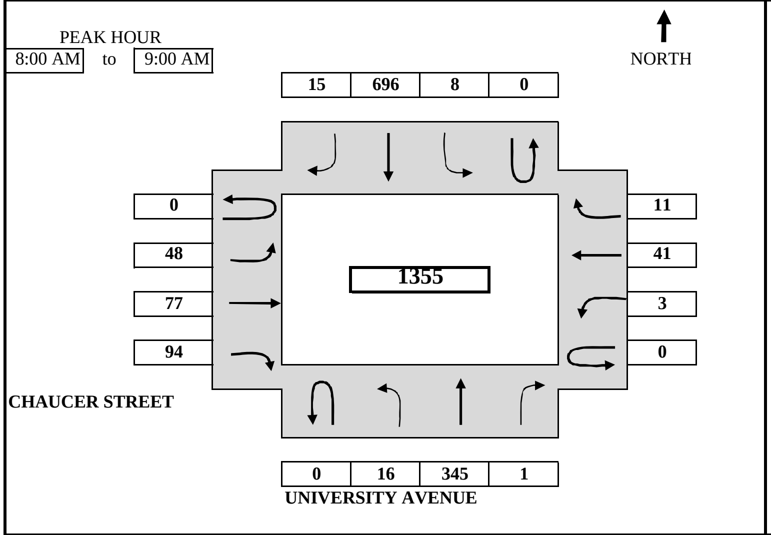
4:45 PM to 5:45 PM

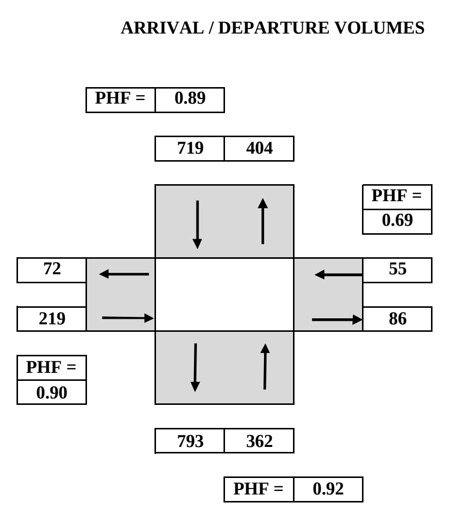
VOLUME BY DIRECTION	NB	SB	EB	WB	TOTAL
PEDESTRIAN	9	6	23	13	**51**
VOLUME BY LEG	N-LEG	S-LEG	E-LEG	W-LEG	TOTAL
PEDESTRIAN	20	16	12	3	**51**

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**UNIVERSITY AVENUE**	**SURVEY TIME:**	**7:00 AM**	**TO**	**9:00 AM**
E-W APPROACH:	**CHAUCER STREET**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-8AM**





TIME		PERIOD	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
7:00 AM	to	7:15 AM		3	61	0		1	163	2		4	5	6		1	3	2	**251**
7:15 AM	to	7:30 AM		4	123	0		2	323	7		6	11	16		1	7	4	**504**
7:30 AM	to	7:45 AM		6	208	0		3	467	13		12	20	31		1	9	6	**776**
7:45 AM	to	8:00 AM		9	308	0		4	603	19		26	32	51		2	16	7	**1077**
8:00 AM	to	8:15 AM		12	397	1		7	755	23		37	45	70		3	31	11	**1392**
8:15 AM	to	8:30 AM		16	480	1		9	914	27		50	65	96		5	42	13	**1718**
8:30 AM	to	8:45 AM		21	559	1		10	1105	29		60	82	125		5	46	14	**2057**
8:45 AM	to	9:00 AM		25	653	1		12	1299	34		74	109	145		5	57	18	**2432**
TOTAL BY PERIOD																			
7:00 AM	to	7:15 AM	0	3	61	0	0	1	163	2	0	4	5	6	0	1	3	2	**251**
7:15 AM	to	7:30 AM	0	1	62	0	0	1	160	5	0	2	6	10	0	0	4	2	**253**
7:30 AM	to	7:45 AM	0	2	85	0	0	1	144	6	0	6	9	15	0	0	2	2	**272**
7:45 AM	to	8:00 AM	0	3	100	0	0	1	136	6	0	14	12	20	0	1	7	1	**301**
8:00 AM	to	8:15 AM	0	3	89	1	0	3	152	4	0	11	13	19	0	1	15	4	**315**
8:15 AM	to	8:30 AM	0	4	83	0	0	2	159	4	0	13	20	26	0	2	11	2	**326**
8:30 AM	to	8:45 AM	0	5	79	0	0	1	191	2	0	10	17	29	0	0	4	1	**339**
8:45 AM	to	9:00 AM	0	4	94	0	0	2	194	5	0	14	27	20	0	0	11	4	**375**
HOURLY TOTALS																			
7:00 AM	to	8:00 AM	0	9	308	0	0	4	603	19	0	26	32	51	0	2	16	7	**1077**
7:15 AM	to	8:15 AM	0	9	336	1	0	6	592	21	0	33	40	64	0	2	28	9	**1141**
7:30 AM	to	8:30 AM	0	12	357	1	0	7	591	20	0	44	54	80	0	4	35	9	**1214**
7:45 AM	to	8:45 AM	0	15	351	1	0	7	638	16	0	48	62	94	0	4	37	8	**1281**
8:00 AM	to	9:00 AM	0	16	345	1	0	8	696	15	0	48	77	94	0	3	41	11	**1355**

PEAK HOUR SUMMARY

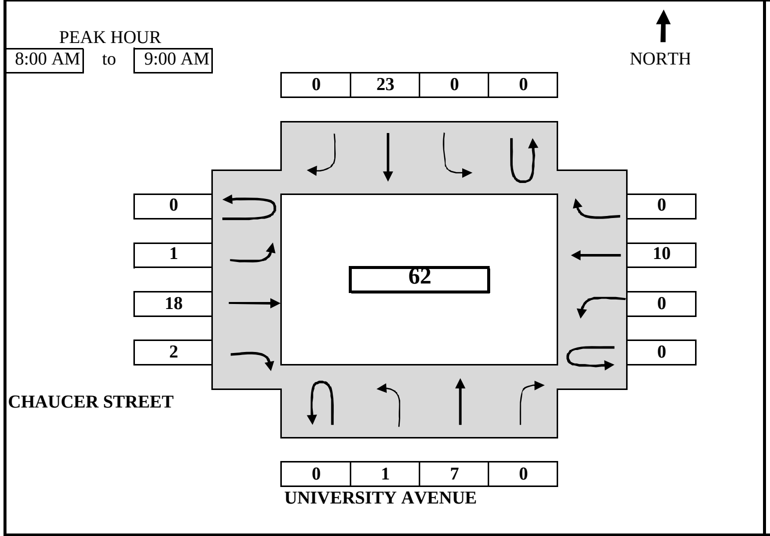
8:00 AM to 9:00 AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	
VOLUME	0	16	345	1	0	8	696	15	0	48	77	94	0	3	41	11	**1355**
PHF BY MOVEMENT	0.00	0.80	0.92	0.25	0.00	0.67	0.90	0.75	0.00	0.86	0.71	0.81	0.00	0.38	0.68	0.69	OVERALL
PHF BY APPROACH	0.92				0.89				0.90				0.69				0.90
BICYCLE	8				23				21				10				**62**
PEDESTRIAN	5				3				7				3				**18**
	N-LEG				**S-LEG**				**E-LEG**				**W-LEG**				
PEDESTRIAN BY LEG:	6				4				3				5				**18**

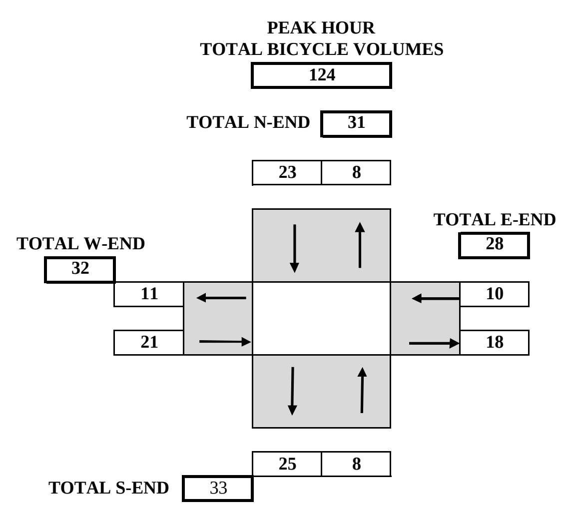
TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

B.A.Y.M.E.T.R.I.C.S.

BICYCLE TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**UNIVERSITY AVENUE**	**SURVEY TIME:**	**7:00 AM**	**TO**	**9:00 AM**
E-W APPROACH:	**CHAUCER STREET**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-8AM**





TIME	PERIOD		NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
7:00 AM	to	7:15 AM	0	0	0	0	0	0	1	0	0	0	5	0	0	0	0	0	**6**
7:15 AM	to	7:30 AM	0	1	0	0	0	0	7	0	0	0	8	1	0	0	0	0	**17**
7:30 AM	to	7:45 AM	0	1	1	0	0	0	15	1	0	0	11	1	0	0	3	0	**33**
7:45 AM	to	8:00 AM	0	1	2	0	0	0	18	1	0	0	14	1	0	0	4	0	**41**
8:00 AM	to	8:15 AM	0	1	2	0	0	0	24	1	0	0	17	1	0	0	7	0	**53**
8:15 AM	to	8:30 AM	0	1	6	0	0	0	26	1	0	0	20	1	0	0	11	0	**66**
8:30 AM	to	8:45 AM	0	2	8	0	0	0	37	1	0	0	29	1	0	0	12	0	**90**
8:45 AM	to	9:00 AM	0	2	9	0	0	0	41	1	0	1	32	3	0	0	14	0	**103**
TOTAL BY PERIOD																			
7:00 AM	to	7:15 AM	0	0	0	0	0	0	1	0	0	0	5	0	0	0	0	0	**6**
7:15 AM	to	7:30 AM	0	1	0	0	0	0	6	0	0	0	3	1	0	0	0	0	**11**
7:30 AM	to	7:45 AM	0	0	1	0	0	0	8	1	0	0	3	0	0	0	3	0	**16**
7:45 AM	to	8:00 AM	0	0	1	0	0	0	3	0	0	0	3	0	0	0	1	0	**8**
8:00 AM	to	8:15 AM	0	0	0	0	0	0	6	0	0	0	3	0	0	0	3	0	**12**
8:15 AM	to	8:30 AM	0	0	4	0	0	0	2	0	0	0	3	0	0	0	4	0	**13**
8:30 AM	to	8:45 AM	0	1	2	0	0	0	11	0	0	0	9	0	0	0	1	0	**24**
8:45 AM	to	9:00 AM	0	0	1	0	0	0	4	0	0	1	3	2	0	0	2	0	**13**
HOURLY TOTALS																			
7:00 AM	to	8:00 AM	0	1	2	0	0	0	18	1	0	0	14	1	0	0	4	0	**41**
7:15 AM	to	8:15 AM	0	1	2	0	0	0	23	1	0	0	12	1	0	0	7	0	**47**
7:30 AM	to	8:30 AM	0	0	6	0	0	0	19	1	0	0	12	0	0	0	11	0	**49**
7:45 AM	to	8:45 AM	0	1	7	0	0	0	22	0	0	0	18	0	0	0	9	0	**57**
8:00 AM	to	9:00 AM	0	1	7	0	0	0	23	0	0	1	18	2	0	0	10	0	**62**

TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

8:00 AM to 9:00 AM					
APPROACH VOLUME	NB	SB	EB	WB	TOTAL
BICYCLE	8	23	21	10	**62**

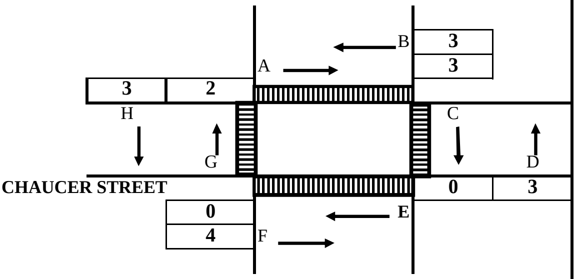
B.A.Y.M.E.T.R.I.C.S.

PEDESTRIAN MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**
N-S APPROACH:	**UNIVERSITY AVENUE**	**DAY:**	**TUESDAY**
E-W APPROACH:	**CHAUCER STREET**	**JURISDICTION:**	**PALO ALTO**
SURVEY PERIOD	**7:00 AM TO 9:00 AM**	**FILE:**	**3805030-8AM**

PEAK HOUR

08:00 AM TO 09:00 AM

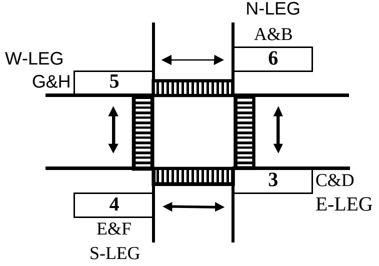


UNIVERSITY AVENUE

PEAK HOUR

TOTAL PEDESTRIAN VOLUMES

18



LEGEND:

- ▥ CROSSWALK
- ▬ SIDEWALK
- — STOP CONTROL LINE
- ● STOP

BY LEG:

N-LEG	**6**
S-LEG	**4**
E-LEG	**3**
W-LEG	**5**

BY DIRECTION:

NB(D+G)	**5**
SB(C+H)	**3**
EB(A+F)	**7**
WB(B+E)	**3**

TIME PERIOD			**NORTH X-WALK**		**EAST X-WALK**		**SOUTH X-WALK**		**WEST X-WALK**		
From		**To**	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***TOTAL***
SURVEY DATA											
07:00 AM	---	07:15 AM	2	0	3	0	0	0	0	2	***7***
07:15 AM	---	07:30 AM	3	2	3	0	0	1	0	3	***12***
07:30 AM	---	07:45 AM	3	4	4	0	0	2	2	4	***19***
07:45 AM	---	08:00 AM	3	4	4	1	1	2	2	5	***22***
08:00 AM	---	08:15 AM	4	5	4	2	1	4	2	6	***28***
08:15 AM	---	08:30 AM	4	5	4	3	1	5	3	7	***32***
08:30 AM	---	08:45 AM	4	6	4	3	1	5	3	8	***34***
08:45 AM	---	09:00 AM	6	7	4	4	1	6	4	8	***40***
TOTAL BY PERIOD											
07:00 AM	---	07:15 AM	2	0	3	0	0	0	0	2	***7***
07:15 AM	---	07:30 AM	1	2	0	0	0	1	0	1	***5***
07:30 AM	---	07:45 AM	0	2	1	0	0	1	2	1	***7***
07:45 AM	---	08:00 AM	0	0	0	1	1	0	0	1	***3***
08:00 AM	---	08:15 AM	1	1	0	1	0	2	0	1	***6***
08:15 AM	---	08:30 AM	0	0	0	1	0	1	1	1	***4***
08:30 AM	---	08:45 AM	0	1	0	0	0	0	0	1	***2***
08:45 AM	---	09:00 AM	2	1	0	1	0	1	1	0	***6***
HOURLY TOTALS											
07:00 AM	---	08:00 AM	3	4	4	1	1	2	2	5	***22***
07:15 AM	---	08:15 AM	2	5	1	2	1	4	2	4	***21***
07:30 AM	---	08:30 AM	1	3	1	3	1	4	3	4	***20***
07:45 AM	---	08:45 AM	1	2	0	3	1	3	1	4	***15***
08:00 AM	---	09:00 AM	3	3	0	3	0	4	2	3	***18***

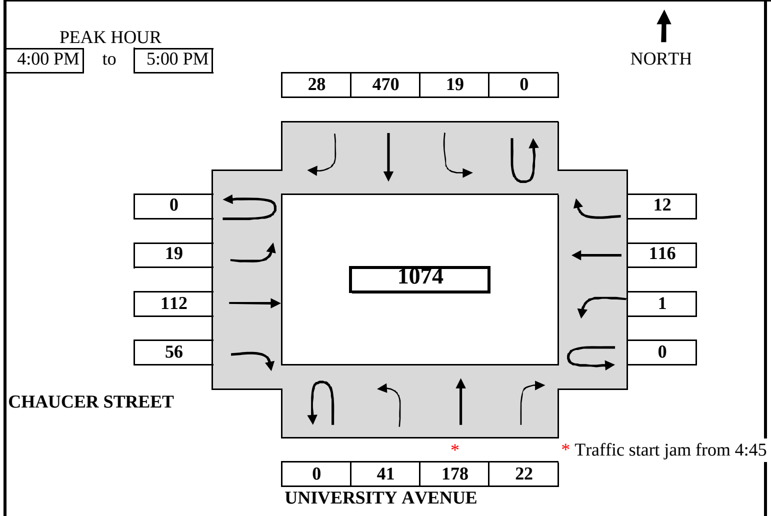
Tel : (510) 232-1271 ***Fax: (510) 232-1272***

8:00 AM to 9:00 AM					
VOLUME BY DIRECTION	NB	SB	EB	WB	TOTAL
PEDESTRIAN	5	3	7	3	**18**
VOLUME BY LEG	N-LEG	S-LEG	E-LEG	W-LEG	TOTAL
PEDESTRIAN	6	4	3	5	**18**

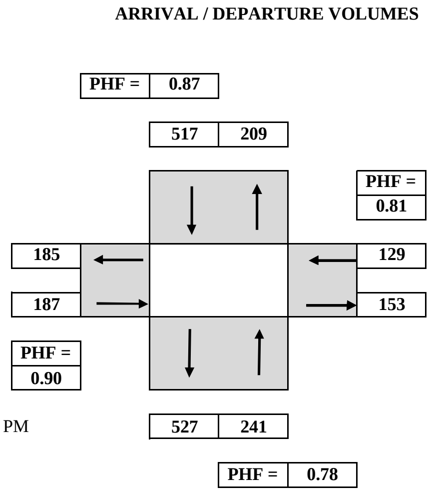
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**UNIVERSITY AVENUE**	**SURVEY TIME:**	**4:00 PM**	**TO**	**6:00 PM**
E-W APPROACH:	**CHAUCER STREET**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-8PM**



* Traffic start jam from 4:45 to 6:00 PM



TIME		**PERIOD**	**NORTHBOUND**				**SOUTHBOUND**				**EASTBOUND**				**WESTBOUND**				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
4:00 PM	to	4:15 PM		7	68	2		3	140	6		9	23	20		0	25	1	**304**
4:15 PM	to	4:30 PM		22	124	4		10	218	16		14	52	34		0	54	6	**554**
4:30 PM	to	4:45 PM		32	154	15		16	349	21		18	81	48		1	80	8	**823**
4:45 PM	to	5:00 PM		41	178	22		19	470	28		19	112	56		1	116	12	**1074**
5:00 PM	to	5:15 PM		52	199	25		21	565	36		20	141	69		1	178	14	**1321**
5:15 PM	to	5:30 PM		56	212	25		25	663	41		23	153	82		3	226	14	**1523**
5:30 PM	to	5:45 PM		62	233	27		26	762	56		24	185	96		3	288	15	**1777**
5:45 PM	to	6:00 PM		66	256	27		33	874	70		25	207	110		3	328	16	**2015**
TOTAL BY PERIOD																			
4:00 PM	to	4:15 PM	0	7	68	2	0	3	140	6	0	9	23	20	0	0	25	1	**304**
4:15 PM	to	4:30 PM	0	15	56	2	0	7	78	10	0	5	29	14	0	0	29	5	**250**
4:30 PM	to	4:45 PM	0	10	30	11	0	6	131	5	0	4	29	14	0	1	26	2	**269**
4:45 PM	to	5:00 PM	0	9	24	7	0	3	121	7	0	1	31	8	0	0	36	4	**251**
5:00 PM	to	5:15 PM	0	11	21	3	0	2	95	8	0	1	29	13	0	0	62	2	**247**
5:15 PM	to	5:30 PM	0	4	13	0	0	4	98	5	0	3	12	13	0	2	48	0	**202**
5:30 PM	to	5:45 PM	0	6	21	2	0	1	99	15	0	1	32	14	0	0	62	1	**254**
5:45 PM	to	6:00 PM	0	4	23	0	0	7	112	14	0	1	22	14	0	0	40	1	**238**
HOURLY TOTALS																			
4:00 PM	to	5:00 PM	0	41	178	22	0	19	470	28	0	19	112	56	0	1	116	12	**1074**
4:15 PM	to	5:15 PM	0	45	131	23	0	18	425	30	0	11	118	49	0	1	153	13	**1017**
4:30 PM	to	5:30 PM	0	34	88	21	0	15	445	25	0	9	101	48	0	3	172	8	**969**
4:45 PM	to	5:45 PM	0	30	79	12	0	10	413	35	0	6	104	48	0	2	208	7	**954**
5:00 PM	to	6:00 PM	0	25	78	5	0	14	404	42	0	6	95	54	0	2	212	4	**941**

PEAK HOUR SUMMARY

4:00 PM to 5:00 PM	**NORTHBOUND**				**SOUTHBOUND**				**EASTBOUND**				**WESTBOUND**				TOTAL
	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	
VOLUME	0	41	178	22	0	19	470	28	0	19	112	56	0	1	116	12	**1074**
PHF BY MOVEMENT	0.00	0.68	0.65	0.50	0.00	0.68	0.84	0.70	0.00	0.53	0.90	0.70	0.00	0.25	0.81	0.60	OVERALL
PHF BY APPROACH	0.78				0.87				0.90				0.81				0.88
BICYCLE	12				7				11				12				**42**
PEDESTRIAN	6				5				2				5				**18**
	N-LEG				**S-LEG**				**E-LEG**				**W-LEG**				
PEDESTRIAN BY LEG:	3				4				3				8				**18**

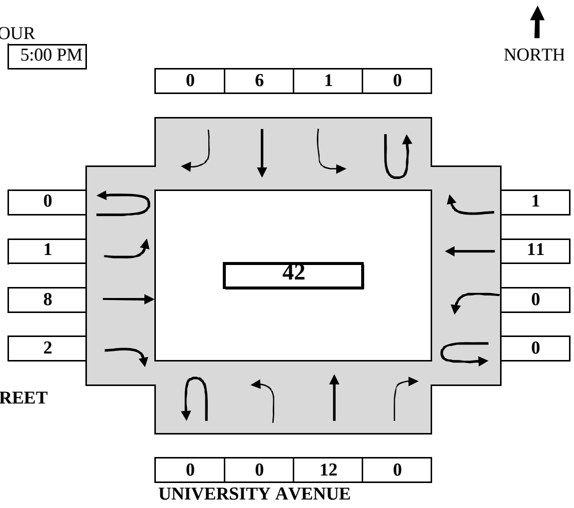
TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

B.A.Y.M.E.T.R.I.C.S.

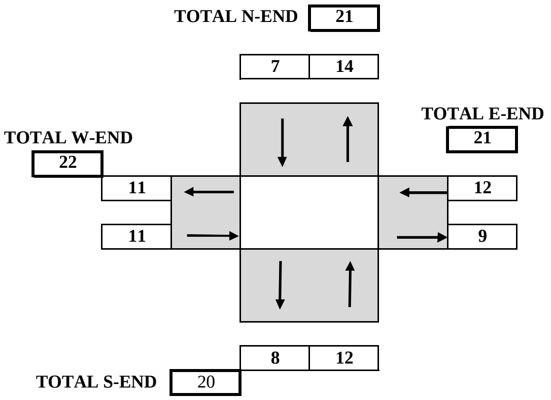
BICYCLE TURNING MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**	**DAY:**	**TUESDAY**
N-S APPROACH:	**UNIVERSITY AVENUE**	**SURVEY TIME:**	**4:00 PM**	**TO**	**6:00 PM**
E-W APPROACH:	**CHAUCER STREET**	**JURISDICTION:**	**PALO ALTO**	**FILE:**	**3805030-8PM**

PEAK HOUR
4:00 PM to 5:00 PM



PEAK HOUR
TOTAL BICYCLE VOLUMES
84



TIME	PERIOD		NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
From		To	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	U-TURN	LEFT	THRU	RIGHT	
SURVEY DATA																			
4:00 PM	to	4:15 PM	0	0	3	0	0	1	2	0	0	0	0	0	0	0	4	0	**10**
4:15 PM	to	4:30 PM	0	0	6	0	0	1	3	0	0	0	5	1	0	0	7	0	**23**
4:30 PM	to	4:45 PM	0	0	10	0	0	1	5	0	0	0	5	1	0	0	8	1	**31**
4:45 PM	to	5:00 PM	0	0	12	0	0	1	6	0	0	1	8	2	0	0	11	1	**42**
5:00 PM	to	5:15 PM	0	0	12	0	0	1	10	1	0	1	9	3	0	0	13	2	**52**
5:15 PM	to	5:30 PM	0	0	15	0	0	1	14	1	0	1	10	5	0	0	15	2	**64**
5:30 PM	to	5:45 PM	0	0	17	0	0	1	16	1	0	1	10	5	0	0	15	2	**68**
5:45 PM	to	6:00 PM	0	0	24	0	0	1	17	1	0	1	11	7	0	0	21	2	**85**
TOTAL BY PERIOD																			
4:00 PM	to	4:15 PM	0	0	3	0	0	1	2	0	0	0	0	0	0	0	4	0	**10**
4:15 PM	to	4:30 PM	0	0	3	0	0	0	1	0	0	0	5	1	0	0	3	0	**13**
4:30 PM	to	4:45 PM	0	0	4	0	0	0	2	0	0	0	0	0	0	0	1	1	**8**
4:45 PM	to	5:00 PM	0	0	2	0	0	0	1	0	0	1	3	1	0	0	3	0	**11**
5:00 PM	to	5:15 PM	0	0	0	0	0	0	4	1	0	0	1	1	0	0	2	1	**10**
5:15 PM	to	5:30 PM	0	0	3	0	0	0	4	0	0	0	1	2	0	0	2	0	**12**
5:30 PM	to	5:45 PM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	**4**
5:45 PM	to	6:00 PM	0	0	7	0	0	0	1	0	0	0	1	2	0	0	6	0	**17**
HOURLY TOTALS																			
4:00 PM	to	5:00 PM	0	0	12	0	0	1	6	0	0	1	8	2	0	0	11	1	**42**
4:15 PM	to	5:15 PM	0	0	9	0	0	0	8	1	0	1	9	3	0	0	9	2	**42**
4:30 PM	to	5:30 PM	0	0	9	0	0	0	11	1	0	1	5	4	0	0	8	2	**41**
4:45 PM	to	5:45 PM	0	0	7	0	0	0	11	1	0	1	5	4	0	0	7	1	**37**
5:00 PM	to	6:00 PM	0	0	12	0	0	0	11	1	0	0	3	5	0	0	10	1	**43**

TEL: (510) 232 - 1271 FAX: (510) 232 - 1272

4:00 PM to 5:00 PM					
APPROACH VOLUME	NB	SB	EB	WB	TOTAL
BICYCLE	12	7	11	12	**42**

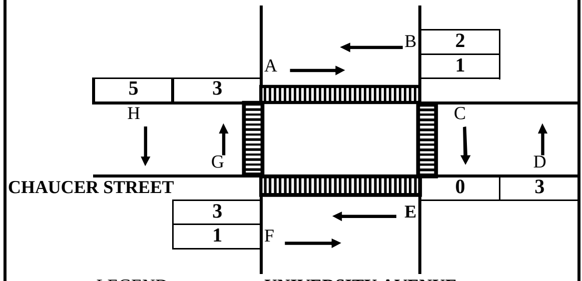
B.A.Y.M.E.T.R.I.C.S.

PEDESTRIAN MOVEMENT SUMMARY

PROJECT:	**TRAFFIC COUNTS IN PALO ALTO**	**SURVEY DATE:**	**5/22/2018**
N-S APPROACH:	**UNIVERSITY AVENUE**	**DAY:**	**TUESDAY**
E-W APPROACH:	**CHAUCER STREET**	**JURISDICTION:**	**PALO ALTO**
SURVEY PERIOD	**4:00 PM TO 6:00 PM**	**FILE:**	**3805030-8PM**

PEAK HOUR

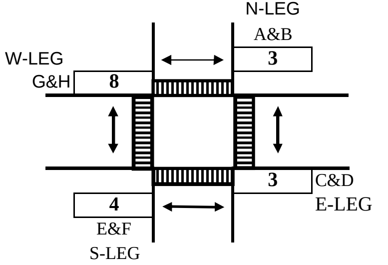
04:00 PM TO 05:00 PM



PEAK HOUR

TOTAL PEDESTRIAN VOLUMES

18



LEGEND:

UNIVERSITY AVENUE

- ▥ CROSSWALK
- ▬ SIDEWALK
- — STOP CONTROL LINE
- ⬣ STOP

BY LEG:

N-LEG	**3**
S-LEG	**4**
E-LEG	**3**
W-LEG	**8**

BY DIRECTION:

NB(D+G)	**6**
SB(C+H)	**5**
EB(A+F)	**2**
WB(B+E)	**5**

TIME PERIOD			**NORTH X-WALK**		**EAST X-WALK**		**SOUTH X-WALK**		**WEST X-WALK**		
From		**To**	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***TOTAL***
SURVEY DATA											
04:00 PM	---	04:15 PM	1	1	0	1	2	0	0	0	***5***
04:15 PM	---	04:30 PM	1	2	0	2	3	0	2	0	***10***
04:30 PM	---	04:45 PM	1	2	0	3	3	1	2	1	***13***
04:45 PM	---	05:00 PM	1	2	0	3	3	1	3	5	***18***
05:00 PM	---	05:15 PM	2	3	0	3	4	2	5	11	***30***
05:15 PM	---	05:30 PM	4	4	1	3	4	2	9	12	***39***
05:30 PM	---	05:45 PM	6	6	2	12	5	3	10	14	***58***
05:45 PM	---	06:00 PM	6	6	2	15	7	3	11	16	***66***
TOTAL BY PERIOD											
04:00 PM	---	04:15 PM	1	1	0	1	2	0	0	0	***5***
04:15 PM	---	04:30 PM	0	1	0	1	1	0	2	0	***5***
04:30 PM	---	04:45 PM	0	0	0	1	0	1	0	1	***3***
04:45 PM	---	05:00 PM	0	0	0	0	0	0	1	4	***5***
05:00 PM	---	05:15 PM	1	1	0	0	1	1	2	6	***12***
05:15 PM	---	05:30 PM	2	1	1	0	0	0	4	1	***9***
05:30 PM	---	05:45 PM	2	2	1	9	1	1	1	2	***19***
05:45 PM	---	06:00 PM	0	0	0	3	2	0	1	2	***8***
HOURLY TOTALS											
04:00 PM	---	05:00 PM	1	2	0	3	3	1	3	5	***18***
04:15 PM	---	05:15 PM	1	2	0	2	2	2	5	11	***25***
04:30 PM	---	05:30 PM	3	2	1	1	1	2	7	12	***29***
04:45 PM	---	05:45 PM	5	4	2	9	2	2	8	13	***45***
05:00 PM	---	06:00 PM	5	4	2	12	4	2	8	11	***48***

Tel : (510) 232-1271 ***Fax: (510) 232-1272***

4:00 PM to 5:00 PM					
VOLUME BY DIRECTION	NB	SB	EB	WB	TOTAL
PEDESTRIAN	6	5	2	5	**18**
VOLUME BY LEG	N-LEG	S-LEG	E-LEG	W-LEG	TOTAL
PEDESTRIAN	3	4	3	8	**18**

Appendix B – Existing Conditions Synchro Reports

- HCM Delay and LOS Reports
- 95th Percentile Queue Length Reports

1: Willow Rd & Gilbert Ave

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	43	134	135	291	5	899	59	908
v/c Ratio	0.86	0.42	0.79	0.92	0.01	0.64	0.17	0.64
Control Delay	150.3	57.7	90.3	89.0	6.2	13.9	6.4	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	150.3	57.7	90.3	89.0	6.2	13.9	6.4	10.9
Queue Length 50th (ft)	41	114	127	262	1	302	14	377
Queue Length 95th (ft)	#90	147	#188	#333	m3	363	31	497
Internal Link Dist (ft)		468		521		1923		337
Turn Bay Length (ft)	55		90		75		90	
Base Capacity (vph)	52	336	177	330	337	1398	343	1420
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	0.83	0.40	0.76	0.88	0.01	0.64	0.17	0.64

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.

HCM Signalized Intersection Capacity Analysis
1: Willow Rd & Gilbert Ave

Existing Conditions
Timing Plan: A.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	32	91	8	107	135	95	4	692	72	56	858	5
Future Volume (vph)	32	91	8	107	135	95	4	692	72	56	858	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.97	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.94		1.00	0.99		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)	1765	1830		1721	1715		1770	1828		1770	1861	
Flt Permitted	0.16	1.00		0.53	1.00		0.24	1.00		0.24	1.00	
Satd. Flow (perm)	290	1830		969	1715		443	1828		451	1861	
Peak-hour factor, PHF	0.74	0.74	0.74	0.79	0.79	0.79	0.85	0.85	0.85	0.95	0.95	0.95
Adj. Flow (vph)	43	123	11	135	171	120	5	814	85	59	903	5
RTOR Reduction (vph)	0	2	0	0	17	0	0	2	0	0	0	0
Lane Group Flow (vph)	43	132	0	135	274	0	5	897	0	59	908	0
Confl. Peds. (#/hr)	2		11	11		2	7		8	8		7
Confl. Bikes (#/hr)			5			9			10			20
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)	26.3	26.3		26.3	26.3		114.5	114.5		114.5	114.5	
Effective Green, g (s)	26.3	26.3		26.3	26.3		114.5	114.5		114.5	114.5	
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.76	0.76		0.76	0.76	
Clearance Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	50	320		169	300		338	1395		344	1420	
v/s Ratio Prot		0.07			c0.16			c0.49			0.49	
v/s Ratio Perm	0.15			0.14			0.01			0.13		
v/c Ratio	0.86	0.41		0.80	0.91		0.01	0.64		0.17	0.64	
Uniform Delay, d1	60.1	55.0		59.3	60.7		4.2	8.2		4.8	8.2	
Progression Factor	1.00	1.00		1.00	1.00		1.36	1.42		1.00	1.00	
Incremental Delay, d2	76.1	0.9		22.5	30.2		0.1	1.6		1.1	2.2	
Delay (s)	136.2	55.8		81.9	91.0		5.8	13.3		5.9	10.4	
Level of Service	F	E		F	F		A	B		A	B	
Approach Delay (s)		75.3			88.1			13.3			10.1	
Approach LOS		E			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	29.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Queues
2: Willow Rd & Middlefield Rd

	↗	→	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	226	465	94	478	180	50	313	162	249	256	499
v/c Ratio	0.80	0.79	0.32	0.85	0.61	0.16	0.94	0.49	0.43	0.43	0.74
Control Delay	80.0	69.3	57.9	75.1	39.2	53.3	96.9	30.1	37.5	37.5	24.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	80.0	69.3	57.9	75.1	39.2	53.3	96.9	30.1	37.5	37.5	24.3
Queue Length 50th (ft)	232	237	81	249	94	42	305	63	215	222	258
Queue Length 95th (ft)	#346	304	133	303	175	69	#360	101	m307	m315	408
Internal Link Dist (ft)		465		339			466			185	
Turn Bay Length (ft)	270		120		65	75		110	150		65
Base Capacity (vph)	308	639	305	581	303	322	339	338	580	594	674
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.73	0.31	0.82	0.59	0.16	0.92	0.48	0.43	0.43	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑↑↱		↰	↑↑↱	↱	↰	↑	↱	↰	↰↑	↱
Traffic Volume (vph)	283	322	17	81	394	172	38	238	123	367	102	464
Future Volume (vph)	283	322	17	81	394	172	38	238	123	367	102	464
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3	5.3	4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	0.91	0.91		1.00	0.91	0.91	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	1.00	0.92	1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.99	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1610	3333		1770	3360	1354	1770	1863	1458	1681	1721	1484
Flt Permitted	0.95	0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1610	3333		1770	3360	1354	1770	1863	1458	1681	1721	1484
Peak-hour factor, PHF	0.90	0.90	0.90	0.86	0.86	0.86	0.76	0.76	0.76	0.93	0.93	0.93
Adj. Flow (vph)	314	358	19	94	458	200	50	313	162	395	110	499
RTOR Reduction (vph)	0	2	0	0	2	71	0	0	73	0	0	162
Lane Group Flow (vph)	226	463	0	94	476	109	50	313	89	249	256	337
Confl. Peds. (#/hr)			1			22			31			23
Confl. Bikes (#/hr)			6			9			16			28
Turn Type	Split	NA		Split	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	2	2		3	3		1	1		4	4	
Permitted Phases						3			1			4
Actuated Green, G (s)	26.3	26.3		25.1	25.1	25.1	26.8	26.8	26.8	51.8	51.8	51.8
Effective Green, g (s)	26.3	26.3		25.1	25.1	25.1	26.8	26.8	26.8	51.8	51.8	51.8
Actuated g/C Ratio	0.18	0.18		0.17	0.17	0.17	0.18	0.18	0.18	0.35	0.35	0.35
Clearance Time (s)	5.3	5.3		5.3	5.3	5.3	4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	282	584		296	562	226	316	332	260	580	594	512
v/s Ratio Prot	c0.14	0.14		0.05	c0.14		0.03	c0.17		0.15	0.15	
v/s Ratio Perm						0.08			0.06			c0.23
v/c Ratio	0.80	0.79		0.32	0.85	0.48	0.16	0.94	0.34	0.43	0.43	0.66
Uniform Delay, d1	59.3	59.2		54.9	60.6	56.6	52.1	60.8	53.9	37.7	37.8	41.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.85
Incremental Delay, d2	15.0	7.3		0.6	11.4	1.6	0.2	34.5	0.8	1.7	1.7	4.9
Delay (s)	74.3	66.6		55.5	72.0	58.2	52.3	95.3	54.7	36.0	36.0	40.2
Level of Service	E	E		E	E	E	D	F	D	D	D	D
Approach Delay (s)		69.1			66.6			78.7			38.1	
Approach LOS		E			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	59.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑			↱			✥		↰		↱
Traffic Volume (veh/h)	84	721	0	0	501	13	0	0	0	23	0	147
Future Volume (Veh/h)	84	721	0	0	501	13	0	0	0	23	0	147
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.92	0.92	0.92	0.25	0.25	0.25	0.99	0.99	0.99
Hourly flow rate (vph)	87	743	0	0	545	14	0	0	0	23	0	148
Pedestrians					6			6			5	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					3.5			3.5			3.5	
Percent Blockage					1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		398										
pX, platoon unblocked				0.94			0.94	0.94	0.94	0.94	0.94	
vC, conflicting volume	564			749			1623	1487	384	1108	1480	557
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	564			594			1528	1383	204	979	1376	557
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	91			100			100	100	100	87	100	69
cM capacity (veh/h)	999			910			47	120	743	175	122	472

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	NB 1	SB 1	SB 2
Volume Total	87	372	372	559	0	23	148
Volume Left	87	0	0	0	0	23	0
Volume Right	0	0	0	14	0	0	148
cSH	999	1700	1700	1700	1700	175	472
Volume to Capacity	0.09	0.22	0.22	0.33	0.00	0.13	0.31
Queue Length 95th (ft)	7	0	0	0	0	11	33
Control Delay (s)	8.9	0.0	0.0	0.0	0.0	28.6	16.1
Lane LOS	A				A	D	C
Approach Delay (s)	0.9			0.0	0.0	17.8	
Approach LOS					A	C	

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis

4: Middlefield Rd & Palo Alto Ave

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↱		↰↱	
Traffic Volume (veh/h)	24	726	494	5	2	20
Future Volume (Veh/h)	24	726	494	5	2	20
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.95	0.95	0.92	0.92
Hourly flow rate (vph)	26	772	520	5	2	22
Pedestrians		2	4		10	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		3.5	3.5		3.5	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)		892				
pX, platoon unblocked					0.86	
vC, conflicting volume	535				1360	534
vC1, stage 1 conf vol					532	
vC2, stage 2 conf vol					828	
vCu, unblocked vol	535				1338	534
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	97				99	96
cM capacity (veh/h)	1023				347	539

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	26	772	525	24
Volume Left	26	0	0	2
Volume Right	0	0	5	22
cSH	1023	1700	1700	516
Volume to Capacity	0.03	0.45	0.31	0.05
Queue Length 95th (ft)	2	0	0	4
Control Delay (s)	8.6	0.0	0.0	12.3
Lane LOS	A			B
Approach Delay (s)	0.3		0.0	12.3
Approach LOS				B

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Volume (veh/h)	2	78	37	17	82	2
Future Volume (Veh/h)	2	78	37	17	82	2
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.72	0.72	0.84	0.84
Hourly flow rate (vph)	2	85	51	24	98	2
Pedestrians					8	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	83				160	71
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	83				160	71
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				88	100
cM capacity (veh/h)	1503				824	984

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	87	75	100
Volume Left	2	0	98
Volume Right	0	24	2
cSH	1503	1700	826
Volume to Capacity	0.00	0.04	0.12
Queue Length 95th (ft)	0	0	10
Control Delay (s)	0.2	0.0	10.0
Lane LOS	A		A
Approach Delay (s)	0.2	0.0	10.0
Approach LOS			A

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	17.0%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 6: Woodland Ave & Pope St/Chaucer St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	72	70	54	84
Average Queue (ft)	39	34	26	49
95th Queue (ft)	60	58	45	76
Link Distance (ft)	283	126	395	346
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

6: Woodland Ave & Pope St/Chaucer St

Timing Plan: A.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	154	4	8	50	27	2	53	33	118	96	3
Future Volume (vph)	1	154	4	8	50	27	2	53	33	118	96	3
Peak Hour Factor	0.88	0.88	0.88	0.82	0.82	0.82	0.79	0.79	0.79	0.94	0.94	0.94
Hourly flow rate (vph)	1	175	5	10	61	33	3	67	42	126	102	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	181	104	112	231
Volume Left (vph)	1	10	3	126
Volume Right (vph)	5	33	42	3
Hadj (s)	0.02	-0.14	-0.19	0.14
Departure Headway (s)	4.9	4.9	4.8	4.9
Degree Utilization, x	0.25	0.14	0.15	0.31
Capacity (veh/h)	679	671	697	690
Control Delay (s)	9.5	8.7	8.6	10.1
Approach Delay (s)	9.5	8.7	8.6	10.1
Approach LOS	A	A	A	B

Intersection Summary			
Delay	9.4		
Level of Service	A		
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
7: Palo Alto Ave & Chaucer St

Existing Conditions
Timing Plan: A.M. Peak

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	0	202	106	3	64	1	17	2	6	2	2	0
Future Volume (Veh/h)	0	202	106	3	64	1	17	2	6	2	2	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.85	0.85	0.85	0.92	0.92	0.92	0.25	0.25	0.25
Hourly flow rate (vph)	0	215	113	4	75	1	18	2	7	8	8	0
Pedestrians		2			3			2			8	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		0			0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					517							
pX, platoon unblocked												
vC, conflicting volume	84			330			363	366	276	374	422	86
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	84			330			363	366	276	374	422	86
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			97	100	99	99	98	100
cM capacity (veh/h)	1501			1227			578	556	759	565	517	964

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	328	80	27	16
Volume Left	0	4	18	8
Volume Right	113	1	7	0
cSH	1501	1227	614	540
Volume to Capacity	0.00	0.00	0.04	0.03
Queue Length 95th (ft)	0	0	3	2
Control Delay (s)	0.0	0.4	11.1	11.9
Lane LOS		A	B	B
Approach Delay (s)	0.0	0.4	11.1	11.9
Approach LOS			B	B

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	28.1%	ICU Level of Service	A
Analysis Period (min)	15		

Queues
8: University Ave & Chaucer St

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	226	72	399	743
v/c Ratio	0.59	0.18	0.37	0.66
Control Delay	26.3	21.4	7.2	11.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	26.3	21.4	7.2	11.3
Queue Length 50th (ft)	55	17	56	135
Queue Length 95th (ft)	165	46	147	338
Internal Link Dist (ft)	437	466	382	498
Turn Bay Length (ft)				
Base Capacity (vph)	744	819	1611	1652
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.30	0.09	0.25	0.45

Intersection Summary

HCM Signalized Intersection Capacity Analysis
8: University Ave & Chaucer St

Existing Conditions
Timing Plan: A.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	48	62	94	4	37	8	15	351	1	7	638	16
Future Volume (vph)	48	62	94	4	37	8	15	351	1	7	638	16
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			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.98			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.94			0.98			1.00			1.00	
Flt Protected		0.99			1.00			1.00			1.00	
Satd. Flow (prot)		1681			1800			1858			1854	
Flt Permitted		0.91			0.97			0.97			1.00	
Satd. Flow (perm)		1555			1757			1802			1847	
Peak-hour factor, PHF	0.90	0.90	0.90	0.69	0.69	0.69	0.92	0.92	0.92	0.89	0.89	0.89
Adj. Flow (vph)	53	69	104	6	54	12	16	382	1	8	717	18
RTOR Reduction (vph)	0	34	0	0	8	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	192	0	0	64	0	0	399	0	0	742	0
Confl. Peds. (#/hr)	6		4	4		6	5		3	3		5
Confl. Bikes (#/hr)			18			10			7			23
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)		13.7			13.7			36.8			36.8	
Effective Green, g (s)		13.7			13.7			36.8			36.8	
Actuated g/C Ratio		0.23			0.23			0.62			0.62	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			4.0			4.0	
Lane Grp Cap (vph)		358			404			1114			1142	
v/s Ratio Prot												
v/s Ratio Perm		c0.12			0.04			0.22			c0.40	
v/c Ratio		0.54			0.16			0.36			0.65	
Uniform Delay, d1		20.1			18.3			5.6			7.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.5			0.2			0.3			1.4	
Delay (s)		21.7			18.5			5.8			8.7	
Level of Service		C			B			A			A	
Approach Delay (s)		21.7			18.5			5.8			8.7	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	59.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues
9: University Ave & Woodland Ave/Scofield Ave

	↗	→	←	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	373	155	490	63	653	253	1038	553
v/c Ratio	0.80	0.60	1.07	0.41	0.61	0.75	0.69	0.60
Control Delay	49.6	39.0	89.3	43.8	29.0	45.6	23.6	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.6	39.0	89.3	43.8	29.0	45.6	23.6	4.8
Queue Length 50th (ft)	100	65	~253	33	153	128	233	0
Queue Length 95th (ft)	#162	126	#442	68	231	192	326	66
Internal Link Dist (ft)		498	512		536		443	
Turn Bay Length (ft)				160		210		
Base Capacity (vph)	484	266	458	249	1064	458	1498	924
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	0.77	0.58	1.07	0.25	0.61	0.55	0.69	0.60

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.

HCM Signalized Intersection Capacity Analysis
9: University Ave & Woodland Ave/Scofield Ave

Existing Conditions
Timing Plan: A.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↱			✥		↰	↑↱		↰	↑↑	↱
Traffic Volume (vph)	343	93	50	15	121	315	58	588	13	233	955	509
Future Volume (vph)	343	93	50	15	121	315	58	588	13	233	955	509
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.98			0.99		1.00	1.00		1.00	1.00	0.90
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.95			0.91		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1730			1668		1770	3526		1770	3539	1431
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1730			1668		1770	3526		1770	3539	1431
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)	373	101	54	16	132	342	63	639	14	253	1038	553
RTOR Reduction (vph)	0	22	0	0	95	0	0	1	0	0	0	323
Lane Group Flow (vph)	373	133	0	0	395	0	63	652	0	253	1038	230
Confl. Peds. (#/hr)			39						3			26
Confl. Bikes (#/hr)			2			2						10
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	11.6	11.6			18.5		6.5	25.6		16.3	35.4	35.4
Effective Green, g (s)	11.6	11.6			18.5		6.5	25.6		16.3	35.4	35.4
Actuated g/C Ratio	0.14	0.14			0.22		0.08	0.30		0.19	0.42	0.42
Clearance Time (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0			2.0		2.0	3.0		2.0	3.0	3.0
Lane Grp Cap (vph)	468	236			363		135	1061		339	1473	595
v/s Ratio Prot	c0.11	0.08			c0.24		0.04	0.18		c0.14	c0.29	
v/s Ratio Perm												0.16
v/c Ratio	0.80	0.56			1.09		0.47	0.61		0.75	0.70	0.39
Uniform Delay, d1	35.6	34.3			33.2		37.6	25.5		32.4	20.5	17.3
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	8.6	1.8			72.5		0.9	2.7		7.6	2.9	1.9
Delay (s)	44.1	36.1			105.8		38.5	28.1		40.0	23.3	19.2
Level of Service	D	D			F		D	C		D	C	B
Approach Delay (s)		41.8			105.8			29.0			24.4	
Approach LOS		D			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	39.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	86.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

1: Willow Rd & Gilbert Ave

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	18	96	88	127	5	262	122	756
v/c Ratio	0.14	0.41	0.59	0.53	0.01	0.19	0.14	0.51
Control Delay	45.6	46.2	63.8	50.1	4.0	3.4	4.0	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.6	46.2	63.8	50.1	4.0	3.4	4.0	6.5
Queue Length 50th (ft)	13	63	66	84	1	30	16	152
Queue Length 95th (ft)	29	93	113	137	3	44	33	207
Internal Link Dist (ft)		468		521		1923		337
Turn Bay Length (ft)	55		90		75		90	
Base Capacity (vph)	181	340	216	341	480	1406	858	1477
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	0.10	0.28	0.41	0.37	0.01	0.19	0.14	0.51

Intersection Summary

1: Willow Rd & Gilbert Ave

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	14	60	16	78	82	31	3	122	43	88	537	7
Future Volume (vph)	14	60	16	78	82	31	3	122	43	88	537	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.98		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.98	1.00		0.99	1.00		0.97	1.00	
Frt	1.00	0.97		1.00	0.96		1.00	0.96		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)	1747	1778		1733	1768		1760	1759		1717	1858	
Flt Permitted	0.53	1.00		0.64	1.00		0.33	1.00		0.60	1.00	
Satd. Flow (perm)	973	1778		1161	1768		604	1759		1080	1858	
Peak-hour factor, PHF	0.79	0.79	0.79	0.89	0.89	0.89	0.63	0.63	0.63	0.72	0.72	0.72
Adj. Flow (vph)	18	76	20	88	92	35	5	194	68	122	746	10
RTOR Reduction (vph)	0	9	0	0	12	0	0	8	0	0	0	0
Lane Group Flow (vph)	18	87	0	88	115	0	5	254	0	122	756	0
Confl. Peds. (#/hr)	6		9	9		6	8		17	17		8
Confl. Bikes (#/hr)			9						11			4
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)	15.4	15.4		15.4	15.4		95.4	95.4		95.4	95.4	
Effective Green, g (s)	15.4	15.4		15.4	15.4		95.4	95.4		95.4	95.4	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.80	0.80		0.80	0.80	
Clearance Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	124	228		148	226		480	1398		858	1477	
v/s Ratio Prot		0.05			0.06			0.14			c0.41	
v/s Ratio Perm	0.02			c0.08			0.01			0.11		
v/c Ratio	0.15	0.38		0.59	0.51		0.01	0.18		0.14	0.51	
Uniform Delay, d1	46.5	47.9		49.4	48.8		2.5	2.9		2.8	4.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	1.1		6.3	1.8		0.0	0.3		0.3	1.3	
Delay (s)	47.0	49.0		55.6	50.6		2.6	3.2		3.2	5.5	
Level of Service	D	D		E	D		A	A		A	A	
Approach Delay (s)		48.7			52.6			3.2			5.2	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues
2: Willow Rd & Middlefield Rd

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	127	584	133	710	99	48	123	319	243	244	354
v/c Ratio	0.36	0.79	0.28	0.78	0.23	0.19	0.45	0.66	0.68	0.67	0.81
Control Delay	54.8	62.8	46.2	56.3	16.8	59.5	63.9	13.0	63.3	62.7	47.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.8	62.8	46.2	56.3	16.8	59.5	63.9	13.0	63.3	62.7	47.0
Queue Length 50th (ft)	123	313	109	374	20	42	113	0	246	246	216
Queue Length 95th (ft)	210	420	182	484	80	80	172	48	330	331	309
Internal Link Dist (ft)		465		339			466			185	
Turn Bay Length (ft)	270		120		65	75		110	150		65
Base Capacity (vph)	433	907	612	1171	531	408	429	580	517	525	570
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.64	0.22	0.61	0.19	0.12	0.29	0.55	0.47	0.46	0.62

Intersection Summary

HCM Signalized Intersection Capacity Analysis
2: Willow Rd & Middlefield Rd

Existing Conditions
Timing Plan: P.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱		↰	↑↱	↱	↰	↑	↱	↰	↰	↱
Traffic Volume (vph)	130	511	14	128	671	106	39	100	258	352	57	297
Future Volume (vph)	130	511	14	128	671	106	39	100	258	352	57	297
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3	5.3	4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	0.91	0.91		1.00	0.91	0.91	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.92	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1610	3369		1770	3381	1400	1770	1863	1458	1681	1708	1531
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1610	3369		1770	3381	1400	1770	1863	1458	1681	1708	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.81	0.81	0.81	0.84	0.84	0.84
Adj. Flow (vph)	141	555	15	133	699	110	48	123	319	419	68	354
RTOR Reduction (vph)	0	1	0	0	1	55	0	0	272	0	0	114
Lane Group Flow (vph)	127	583	0	133	709	44	48	123	47	243	244	240
Confl. Peds. (#/hr)			5			9			28			11
Confl. Bikes (#/hr)			6			3			19			6
Turn Type	Split	NA		Split	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	2	2		3	3		1	1		4	4	
Permitted Phases						3			1			4
Actuated Green, G (s)	30.4	30.4		37.2	37.2	37.2	20.3	20.3	20.3	29.6	29.6	29.6
Effective Green, g (s)	30.4	30.4		37.2	37.2	37.2	20.3	20.3	20.3	29.6	29.6	29.6
Actuated g/C Ratio	0.22	0.22		0.27	0.27	0.27	0.15	0.15	0.15	0.22	0.22	0.22
Clearance Time (s)	5.3	5.3		5.3	5.3	5.3	4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	355	744		478	914	378	261	275	215	361	367	329
v/s Ratio Prot	0.08	c0.17		0.08	c0.21		0.03	c0.07		0.14	0.14	
v/s Ratio Perm						0.03			0.03			c0.16
v/c Ratio	0.36	0.78		0.28	0.78	0.12	0.18	0.45	0.22	0.67	0.66	0.73
Uniform Delay, d1	45.3	50.5		39.6	46.3	37.8	51.3	53.5	51.6	49.5	49.4	50.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	5.4		0.3	4.2	0.1	0.3	1.2	0.5	4.9	4.5	8.1
Delay (s)	45.9	55.9		39.9	50.5	37.9	51.7	54.6	52.1	54.4	53.9	58.3
Level of Service	D	E		D	D	D	D	D	D	D	D	E
Approach Delay (s)		54.1			47.7			52.7			55.9	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	52.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	137.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

3: Palo Alto Ave/Woodland Ave & Middlefield Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑			↱			✥		↰		↱
Traffic Volume (veh/h)	196	914	0	0	767	48	0	0	0	22	0	92
Future Volume (Veh/h)	196	914	0	0	767	48	0	0	0	22	0	92
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.25	0.25	0.25	0.73	0.73	0.73
Hourly flow rate (vph)	236	1101	0	0	834	52	0	0	0	30	0	126
Pedestrians					4			2			12	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					3.5			3.5			3.5	
Percent Blockage					0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		398										
pX, platoon unblocked				0.86			0.86	0.86	0.86	0.86	0.86	
vC, conflicting volume	898			1103			2561	2473	556	1898	2447	872
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	898			801			2491	2389	167	1723	2359	872
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	68			100			100	100	100	17	100	57
cM capacity (veh/h)	743			704			5	19	727	36	20	290

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	NB 1	SB 1	SB 2
Volume Total	236	550	550	886	0	30	126
Volume Left	236	0	0	0	0	30	0
Volume Right	0	0	0	52	0	0	126
cSH	743	1700	1700	1700	1700	36	290
Volume to Capacity	0.32	0.32	0.32	0.52	0.00	0.83	0.43
Queue Length 95th (ft)	34	0	0	0	0	75	52
Control Delay (s)	12.1	0.0	0.0	0.0	0.0	260.5	26.6
Lane LOS	B				A	F	D
Approach Delay (s)	2.1			0.0	0.0	71.5	
Approach LOS					A	F	

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

4: Middlefield Rd & Palo Alto Ave

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↱		Y	
Traffic Volume (veh/h)	43	865	807	2	1	35
Future Volume (Veh/h)	43	865	807	2	1	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.89	0.89	0.69	0.69
Hourly flow rate (vph)	46	920	907	2	1	51
Pedestrians			2		14	
Lane Width (ft)			12.0		12.0	
Walking Speed (ft/s)			3.5		3.5	
Percent Blockage			0		1	
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)		892				
pX, platoon unblocked					0.82	
vC, conflicting volume	923				1936	922
vC1, stage 1 conf vol					922	
vC2, stage 2 conf vol					1014	
vCu, unblocked vol	923				2033	922
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	94				100	84
cM capacity (veh/h)	730				233	323

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	46	920	909	52
Volume Left	46	0	0	1
Volume Right	0	0	2	51
cSH	730	1700	1700	321
Volume to Capacity	0.06	0.54	0.53	0.16
Queue Length 95th (ft)	5	0	0	14
Control Delay (s)	10.3	0.0	0.0	18.4
Lane LOS	B			C
Approach Delay (s)	0.5		0.0	18.4
Approach LOS				C

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Volume (veh/h)	1	51	104	100	18	3
Future Volume (Veh/h)	1	51	104	100	18	3
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.76	0.76	0.86	0.86	0.53	0.53
Hourly flow rate (vph)	1	67	121	116	34	6
Pedestrians					7	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	244				255	186
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	244				255	186
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				95	99
cM capacity (veh/h)	1313				728	850

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	68	237	40
Volume Left	1	0	34
Volume Right	0	116	6
cSH	1313	1700	744
Volume to Capacity	0.00	0.14	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.1	0.0	10.1
Lane LOS	A		B
Approach Delay (s)	0.1	0.0	10.1
Approach LOS			B

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 6: Woodland Ave & Pope St/Chaucer St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	66	131	86	81
Average Queue (ft)	30	83	43	43
95th Queue (ft)	53	124	71	68
Link Distance (ft)	288	125	400	344
Upstream Blk Time (%)		1		
Queuing Penalty (veh)		3		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	60	3	32	187	260	14	129	27	113	45	3
Future Volume (vph)	6	60	3	32	187	260	14	129	27	113	45	3
Peak Hour Factor	0.73	0.73	0.73	0.91	0.91	0.91	0.78	0.78	0.78	0.82	0.82	0.82
Hourly flow rate (vph)	8	82	4	35	205	286	18	165	35	138	55	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	94	526	218	197
Volume Left (vph)	8	35	18	138
Volume Right (vph)	4	286	35	4
Hadj (s)	0.03	-0.28	-0.05	0.16
Departure Headway (s)	6.1	5.1	6.0	6.2
Degree Utilization, x	0.16	0.74	0.36	0.34
Capacity (veh/h)	505	526	542	522
Control Delay (s)	10.3	21.2	12.3	12.3
Approach Delay (s)	10.3	21.2	12.3	12.3
Approach LOS	B	C	B	B

Intersection Summary			
Delay	16.6		
Level of Service	C		
Intersection Capacity Utilization	63.8%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
7: Palo Alto Ave & Chaucer St

Existing Conditions
Timing Plan: P.M. Peak

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	3	144	51	3	261	8	204	7	15	1	0	5
Future Volume (Veh/h)	3	144	51	3	261	8	204	7	15	1	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.83	0.83	0.83	0.83	0.83	0.83	0.50	0.50	0.50
Hourly flow rate (vph)	4	169	60	4	314	10	246	8	18	2	0	10
Pedestrians		3			12			16			20	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		0			1			2			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					517							
pX, platoon unblocked	0.94						0.94	0.94		0.94	0.94	0.94
vC, conflicting volume	344			245			563	575	227	588	600	342
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	274			245			506	519	227	533	545	272
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			42	98	98	99	100	99
cM capacity (veh/h)	1192			1301			422	417	791	391	403	707

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	233	328	272	12
Volume Left	4	4	246	2
Volume Right	60	10	18	10
cSH	1192	1301	435	623
Volume to Capacity	0.00	0.00	0.63	0.02
Queue Length 95th (ft)	0	0	104	1
Control Delay (s)	0.2	0.1	26.1	10.9
Lane LOS	A	A	D	B
Approach Delay (s)	0.2	0.1	26.1	10.9
Approach LOS			D	B

Intersection Summary			
Average Delay	8.7		
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
Analysis Period (min)	15		

8: University Ave & Chaucer St

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	173	269	138	528
v/c Ratio	0.33	0.50	0.18	0.59
Control Delay	14.1	18.3	7.5	11.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	14.1	18.3	7.5	11.6
Queue Length 50th (ft)	27	53	16	78
Queue Length 95th (ft)	88	129	46	208
Internal Link Dist (ft)	437	466	382	498
Turn Bay Length (ft)				
Base Capacity (vph)	1040	1105	1535	1767
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.17	0.24	0.09	0.30

Intersection Summary

HCM Signalized Intersection Capacity Analysis
8: University Ave & Chaucer St

Existing Conditions
Timing Plan: P.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	6	95	54	2	212	4	25	78	5	14	404	42
Future Volume (vph)	6	95	54	2	212	4	25	78	5	14	404	42
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			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.99			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.95			1.00			0.99			0.99	
Flt Protected		1.00			1.00			0.99			1.00	
Satd. Flow (prot)		1751			1856			1826			1831	
Flt Permitted		0.98			1.00			0.85			0.99	
Satd. Flow (perm)		1728			1853			1579			1818	
Peak-hour factor, PHF	0.90	0.90	0.90	0.81	0.81	0.81	0.78	0.78	0.78	0.87	0.87	0.87
Adj. Flow (vph)	7	106	60	2	262	5	32	100	6	16	464	48
RTOR Reduction (vph)	0	20	0	0	1	0	0	2	0	0	5	0
Lane Group Flow (vph)	0	153	0	0	268	0	0	136	0	0	523	0
Confl. Peds. (#/hr)	3		4	4		3	8		3	3		8
Confl. Bikes (#/hr)			8			11			12			6
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)		13.3			13.3			22.6			22.6	
Effective Green, g (s)		13.3			13.3			22.6			22.6	
Actuated g/C Ratio		0.30			0.30			0.50			0.50	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			4.0			4.0	
Lane Grp Cap (vph)		511			548			794			915	
v/s Ratio Prot												
v/s Ratio Perm		0.09			c0.14			0.09			c0.29	
v/c Ratio		0.30			0.49			0.17			0.57	
Uniform Delay, d1		12.2			13.0			6.1			7.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.3			0.7			0.1			1.0	
Delay (s)		12.5			13.7			6.2			8.8	
Level of Service		B			B			A			A	
Approach Delay (s)		12.5			13.7			6.2			8.8	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	44.9	Sum of lost time (s)	9.0
Intersection Capacity Utilization	46.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

9: University Ave & Woodland Ave/Scofield Ave

	↗	→	←	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	542	211	568	41	791	147	561	355
v/c Ratio	0.87	0.63	0.99	0.32	0.69	0.64	0.38	0.46
Control Delay	51.4	41.0	56.0	45.3	30.1	48.9	19.5	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.4	41.0	56.0	45.3	30.1	48.9	19.5	4.3
Queue Length 50th (ft)	154	104	~216	23	195	80	115	0
Queue Length 95th (ft)	#235	178	#419	53	283	134	167	55
Internal Link Dist (ft)		498	512		536		443	
Turn Bay Length (ft)				160		210		
Base Capacity (vph)	648	346	574	334	1154	334	1487	779
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	0.84	0.61	0.99	0.12	0.69	0.44	0.38	0.46

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↱			✥		↰	↑↱		↰	↑↑	↱
Traffic Volume (vph)	499	153	41	11	67	444	38	705	23	135	516	327
Future Volume (vph)	499	153	41	11	67	444	38	705	23	135	516	327
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.98			1.00		1.00	1.00		1.00	1.00	0.86
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97			0.89		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1776			1647		1770	3519		1770	3539	1368
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1776			1647		1770	3519		1770	3539	1368
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)	542	166	45	12	73	483	41	766	25	147	561	355
RTOR Reduction (vph)	0	11	0	0	220	0	0	3	0	0	0	211
Lane Group Flow (vph)	542	200	0	0	348	0	41	788	0	147	561	144
Confl. Peds. (#/hr)			47						1			40
Confl. Bikes (#/hr)			4						4			7
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	16.4	16.4			19.4		4.6	29.4		11.8	36.6	36.6
Effective Green, g (s)	16.4	16.4			19.4		4.6	29.4		11.8	36.6	36.6
Actuated g/C Ratio	0.18	0.18			0.22		0.05	0.33		0.13	0.41	0.41
Clearance Time (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0			2.0		2.0	3.0		2.0	3.0	3.0
Lane Grp Cap (vph)	625	323			355		90	1149		232	1439	556
v/s Ratio Prot	c0.16	0.11			c0.21		0.02	c0.22		c0.08	0.16	
v/s Ratio Perm												0.11
v/c Ratio	0.87	0.62			0.98		0.46	0.69		0.63	0.39	0.26
Uniform Delay, d1	35.7	33.9			35.1		41.5	26.3		37.1	18.8	17.7
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.8	2.7			42.4		1.3	3.3		4.1	0.8	1.1
Delay (s)	47.5	36.6			77.6		42.8	29.6		41.2	19.6	18.8
Level of Service	D	D			E		D	C		D	B	B
Approach Delay (s)		44.4			77.6			30.3			22.3	
Approach LOS		D			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	39.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	90.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Appendix C – Existing Plus Bridge Closure Conditions Synchro Reports

- HCM Delay and LOS Reports
- 95th Percentile Queue Length Reports

Queues

1: Willow Rd & Gilbert Ave

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	43	134	135	291	5	899	59	908
v/c Ratio	0.86	0.42	0.79	0.92	0.01	0.64	0.17	0.64
Control Delay	150.3	57.7	90.3	89.0	6.2	13.9	6.4	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	150.3	57.7	90.3	89.0	6.2	13.9	6.4	10.9
Queue Length 50th (ft)	41	114	127	262	1	302	14	377
Queue Length 95th (ft)	#90	147	#188	#333	m3	363	31	497
Internal Link Dist (ft)		468		521		1923		337
Turn Bay Length (ft)	55		90		75		90	
Base Capacity (vph)	52	336	177	330	337	1398	343	1420
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	0.83	0.40	0.76	0.88	0.01	0.64	0.17	0.64

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.

1: Willow Rd & Gilbert Ave

Timing Plan: A.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	32	91	8	107	135	95	4	692	72	56	858	5
Future Volume (vph)	32	91	8	107	135	95	4	692	72	56	858	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.97	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.94		1.00	0.99		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)	1765	1830		1721	1715		1770	1828		1770	1861	
Flt Permitted	0.16	1.00		0.53	1.00		0.24	1.00		0.24	1.00	
Satd. Flow (perm)	290	1830		969	1715		443	1828		451	1861	
Peak-hour factor, PHF	0.74	0.74	0.74	0.79	0.79	0.79	0.85	0.85	0.85	0.95	0.95	0.95
Adj. Flow (vph)	43	123	11	135	171	120	5	814	85	59	903	5
RTOR Reduction (vph)	0	2	0	0	17	0	0	2	0	0	0	0
Lane Group Flow (vph)	43	132	0	135	274	0	5	897	0	59	908	0
Confl. Peds. (#/hr)	2		11	11		2	7		8	8		7
Confl. Bikes (#/hr)			5			9			10			20
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)	26.3	26.3		26.3	26.3		114.5	114.5		114.5	114.5	
Effective Green, g (s)	26.3	26.3		26.3	26.3		114.5	114.5		114.5	114.5	
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.76	0.76		0.76	0.76	
Clearance Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	50	320		169	300		338	1395		344	1420	
v/s Ratio Prot		0.07			c0.16			c0.49			0.49	
v/s Ratio Perm	0.15			0.14			0.01			0.13		
v/c Ratio	0.86	0.41		0.80	0.91		0.01	0.64		0.17	0.64	
Uniform Delay, d1	60.1	55.0		59.3	60.7		4.2	8.2		4.8	8.2	
Progression Factor	1.00	1.00		1.00	1.00		1.36	1.42		1.00	1.00	
Incremental Delay, d2	76.1	0.9		22.5	30.2		0.1	1.6		1.1	2.2	
Delay (s)	136.2	55.8		81.9	91.0		5.8	13.3		5.9	10.4	
Level of Service	F	E		F	F		A	B		A	B	
Approach Delay (s)		75.3			88.1			13.3			10.1	
Approach LOS		E			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	29.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

	↗	→	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	226	465	94	478	180	50	313	162	249	256	499
v/c Ratio	0.80	0.79	0.32	0.85	0.61	0.16	0.94	0.49	0.43	0.43	0.74
Control Delay	80.0	69.3	57.9	75.1	39.2	53.3	96.9	30.1	37.5	37.5	24.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	80.0	69.3	57.9	75.1	39.2	53.3	96.9	30.1	37.5	37.5	24.3
Queue Length 50th (ft)	232	237	81	249	94	42	305	63	215	222	258
Queue Length 95th (ft)	#346	304	133	303	175	69	#360	101	m307	m315	408
Internal Link Dist (ft)		465		339			466			185	
Turn Bay Length (ft)	270		120		65	75		110	150		65
Base Capacity (vph)	308	639	305	581	303	322	339	338	580	594	674
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.73	0.31	0.82	0.59	0.16	0.92	0.48	0.43	0.43	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.

HCM Signalized Intersection Capacity Analysis — Existing + Bridge Closure Conditions

2: Willow Rd & Middlefield Rd

Timing Plan: A.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑↱		↰	↑↱	↱	↰	↑	↱	↰	↰↑	↱
Traffic Volume (vph)	283	322	17	81	394	172	38	238	123	367	102	464
Future Volume (vph)	283	322	17	81	394	172	38	238	123	367	102	464
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3	5.3	4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	0.91	0.91		1.00	0.91	0.91	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	1.00	0.92	1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.99	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1610	3333		1770	3360	1354	1770	1863	1458	1681	1721	1484
Flt Permitted	0.95	0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1610	3333		1770	3360	1354	1770	1863	1458	1681	1721	1484
Peak-hour factor, PHF	0.90	0.90	0.90	0.86	0.86	0.86	0.76	0.76	0.76	0.93	0.93	0.93
Adj. Flow (vph)	314	358	19	94	458	200	50	313	162	395	110	499
RTOR Reduction (vph)	0	2	0	0	2	71	0	0	73	0	0	162
Lane Group Flow (vph)	226	463	0	94	476	109	50	313	89	249	256	337
Confl. Peds. (#/hr)			1			22			31			23
Confl. Bikes (#/hr)			6			9			16			28
Turn Type	Split	NA		Split	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	2	2		3	3		1	1		4	4	
Permitted Phases						3			1			4
Actuated Green, G (s)	26.3	26.3		25.1	25.1	25.1	26.8	26.8	26.8	51.8	51.8	51.8
Effective Green, g (s)	26.3	26.3		25.1	25.1	25.1	26.8	26.8	26.8	51.8	51.8	51.8
Actuated g/C Ratio	0.18	0.18		0.17	0.17	0.17	0.18	0.18	0.18	0.35	0.35	0.35
Clearance Time (s)	5.3	5.3		5.3	5.3	5.3	4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	282	584		296	562	226	316	332	260	580	594	512
v/s Ratio Prot	c0.14	0.14		0.05	c0.14		0.03	c0.17		0.15	0.15	
v/s Ratio Perm						0.08			0.06			c0.23
v/c Ratio	0.80	0.79		0.32	0.85	0.48	0.16	0.94	0.34	0.43	0.43	0.66
Uniform Delay, d1	59.3	59.2		54.9	60.6	56.6	52.1	60.8	53.9	37.7	37.8	41.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.85
Incremental Delay, d2	15.0	7.3		0.6	11.4	1.6	0.2	34.5	0.8	1.7	1.7	4.9
Delay (s)	74.3	66.6		55.5	72.0	58.2	52.3	95.3	54.7	36.0	36.0	40.2
Level of Service	E	E		E	E	E	D	F	D	D	D	D
Approach Delay (s)		69.1			66.6			78.7			38.1	
Approach LOS		E			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	59.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

3: Palo Alto Ave/Woodland Ave & Middlefield Rd

Timing Plan: A.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑			↱			✣		↰		↱
Traffic Volume (veh/h)	84	721	0	0	501	38	0	0	0	222	0	147
Future Volume (Veh/h)	84	721	0	0	501	38	0	0	0	222	0	147
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.92	0.92	0.92	0.25	0.25	0.25	0.99	0.99	0.99
Hourly flow rate (vph)	87	743	0	0	545	41	0	0	0	224	0	148
Pedestrians					6			6			5	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					3.5			3.5			3.5	
Percent Blockage					1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		398										
pX, platoon unblocked				0.94			0.94	0.94	0.94	0.94	0.94	
vC, conflicting volume	591			749			1636	1514	384	1122	1494	570
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	591			594			1543	1412	204	993	1390	570
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	91			100			100	100	100	0	100	68
cM capacity (veh/h)	976			910			46	115	743	171	119	462

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	NB 1	SB 1	SB 2
Volume Total	87	372	372	586	0	224	148
Volume Left	87	0	0	0	0	224	0
Volume Right	0	0	0	41	0	0	148
cSH	976	1700	1700	1700	1700	171	462
Volume to Capacity	0.09	0.22	0.22	0.34	0.00	1.31	0.32
Queue Length 95th (ft)	7	0	0	0	0	327	34
Control Delay (s)	9.0	0.0	0.0	0.0	0.0	227.4	16.4
Lane LOS	A				A	F	C
Approach Delay (s)	0.9			0.0	0.0	143.4	
Approach LOS					A	F	

Intersection Summary			
Average Delay	30.3		
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↱		↰↱	
Traffic Volume (veh/h)	24	925	507	5	2	32
Future Volume (Veh/h)	24	925	507	5	2	32
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.95	0.95	0.92	0.92
Hourly flow rate (vph)	26	984	534	5	2	35
Pedestrians		2	4		10	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		3.5	3.5		3.5	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)		892				
pX, platoon unblocked					0.86	
vC, conflicting volume	549				1586	548
vC1, stage 1 conf vol					546	
vC2, stage 2 conf vol					1040	
vCu, unblocked vol	549				1601	548
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	97				99	93
cM capacity (veh/h)	1011				276	530

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	26	984	539	37
Volume Left	26	0	0	2
Volume Right	0	0	5	35
cSH	1011	1700	1700	505
Volume to Capacity	0.03	0.58	0.32	0.07
Queue Length 95th (ft)	2	0	0	6
Control Delay (s)	8.7	0.0	0.0	12.7
Lane LOS	A			B
Approach Delay (s)	0.2		0.0	12.7
Approach LOS				B

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
	↗	→	←	↖	↘	↙
Lane Configurations		↰	↱		Y	
Traffic Volume (veh/h)	2	78	37	17	82	2
Future Volume (Veh/h)	2	78	37	17	82	2
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.72	0.72	0.84	0.84
Hourly flow rate (vph)	2	85	51	24	98	2
Pedestrians					8	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	83				160	71
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	83				160	71
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				88	100
cM capacity (veh/h)	1503				824	984

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	87	75	100
Volume Left	2	0	98
Volume Right	0	24	2
cSH	1503	1700	826
Volume to Capacity	0.00	0.04	0.12
Queue Length 95th (ft)	0	0	10
Control Delay (s)	0.2	0.0	10.0
Lane LOS	A		A
Approach Delay (s)	0.2	0.0	10.0
Approach LOS			A

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	17.0%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 6: Woodland Ave & Pope St/Chaucer St

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	68	54	81
Average Queue (ft)	37	24	43
95th Queue (ft)	59	43	67
Link Distance (ft)	283	395	346
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

HCM Unsignalized Intersection Capacity Analysis
6: Woodland Ave & Pope St/Chaucer St

Existing + Bridge Closure Conditions
Timing Plan: A.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	25	0	134	0	0	0	20	58	0	0	138	32
Future Volume (vph)	25	0	134	0	0	0	20	58	0	0	138	32
Peak Hour Factor	0.88	0.88	0.88	0.82	0.82	0.82	0.79	0.79	0.79	0.94	0.94	0.94
Hourly flow rate (vph)	28	0	152	0	0	0	25	73	0	0	147	34

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	180	0	98	181
Volume Left (vph)	28	0	25	0
Volume Right (vph)	152	0	0	34
Hadj (s)	-0.44	0.00	0.09	-0.08
Departure Headway (s)	4.1	4.7	4.6	4.3
Degree Utilization, x	0.20	0.00	0.12	0.22
Capacity (veh/h)	821	705	744	788
Control Delay (s)	8.1	7.7	8.2	8.5
Approach Delay (s)	8.1	0.0	8.2	8.5
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.3		
Level of Service	A		
Intersection Capacity Utilization	34.6%	ICU Level of Service	A
Analysis Period (min)	15		

7: Palo Alto Ave & Chaucer St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	0	0	0	3	0	1	0	2	6	2	2	0
Future Volume (Veh/h)	0	0	0	3	0	1	0	2	6	2	2	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.85	0.85	0.85	0.92	0.92	0.92	0.25	0.25	0.25
Hourly flow rate (vph)	0	0	0	4	0	1	0	2	7	8	8	0
Pedestrians		2			3			2			8	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		0			0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					517							
pX, platoon unblocked												
vC, conflicting volume	9			2			16	19	5	28	18	10
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	9			2			16	19	5	28	18	10
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	99	99	100
cM capacity (veh/h)	1599			1617			979	864	1073	955	865	1060

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	5	9	16
Volume Left	0	4	0	8
Volume Right	0	1	7	0
cSH	1700	1617	1018	908
Volume to Capacity	0.00	0.00	0.01	0.02
Queue Length 95th (ft)	0	0	1	1
Control Delay (s)	0.0	5.8	8.6	9.0
Lane LOS		A	A	A
Approach Delay (s)	0.0	5.8	8.6	9.0
Approach LOS			A	A

Intersection Summary			
Average Delay	8.4		
Intersection Capacity Utilization	16.6%	ICU Level of Service	A
Analysis Period (min)	15		

Queues
8: University Ave & Chaucer St

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	8	71	394	766
v/c Ratio	0.03	0.23	0.26	0.50
Control Delay	20.6	13.0	2.8	4.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.6	13.0	2.8	4.5
Queue Length 50th (ft)	1	3	31	81
Queue Length 95th (ft)	14	24	70	174
Internal Link Dist (ft)	437	466	382	498
Turn Bay Length (ft)				
Base Capacity (vph)	987	986	1787	1781
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.01	0.07	0.22	0.43

Intersection Summary

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	2	2	4	7	2	40	1	361	1	7	674	1
Future Volume (vph)	2	2	4	7	2	40	1	361	1	7	674	1
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			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.94			0.94			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.93			0.89			1.00			1.00	
Flt Protected		0.99			0.99			1.00			1.00	
Satd. Flow (prot)		1619			1546			1862			1861	
Flt Permitted		0.92			0.95			1.00			1.00	
Satd. Flow (perm)		1500			1476			1860			1855	
Peak-hour factor, PHF	0.90	0.90	0.90	0.69	0.69	0.69	0.92	0.92	0.92	0.89	0.89	0.89
Adj. Flow (vph)	2	2	4	10	3	58	1	392	1	8	757	1
RTOR Reduction (vph)	0	4	0	0	54	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	4	0	0	17	0	0	394	0	0	766	0
Confl. Peds. (#/hr)	6		4	4		6	5		3	3		5
Confl. Bikes (#/hr)			18			10			7			23
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)		3.5			3.5			33.3			33.3	
Effective Green, g (s)		3.5			3.5			33.3			33.3	
Actuated g/C Ratio		0.08			0.08			0.73			0.73	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			4.0			4.0	
Lane Grp Cap (vph)		114			112			1352			1348	
v/s Ratio Prot												
v/s Ratio Perm		0.00			c0.01			0.21			c0.41	
v/c Ratio		0.04			0.16			0.29			0.57	
Uniform Delay, d1		19.6			19.8			2.2			2.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.7			0.2			0.7	
Delay (s)		19.7			20.4			2.3			3.6	
Level of Service		B			C			A			A	
Approach Delay (s)		19.7			20.4			2.3			3.6	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	4.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	45.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues
9: University Ave & Woodland Ave/Scofield Ave

Existing + Bridge Closure Conditions
Timing Plan: A.M. Peak

	↗	→	←	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	424	219	490	108	653	253	1022	570
v/c Ratio	0.88	0.78	1.07	0.57	0.62	0.75	0.72	0.62
Control Delay	57.4	45.9	89.9	47.1	29.3	45.6	25.6	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	45.9	89.9	47.1	29.3	45.6	25.6	5.3
Queue Length 50th (ft)	115	84	~253	56	153	128	239	0
Queue Length 95th (ft)	#195	#194	#442	103	231	192	329	71
Internal Link Dist (ft)		498	512		536		443	
Turn Bay Length (ft)				160		210		
Base Capacity (vph)	484	284	457	249	1051	458	1420	915
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	0.88	0.77	1.07	0.43	0.62	0.55	0.72	0.62

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.

HCM Signalized Intersection Capacity Analysis
9: University Ave & Woodland Ave/Scofield Ave

Existing + Bridge Closure Conditions
Timing Plan: A.M. Peak

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↱			✣		↰	↑↱		↰	↑↑	↱
Traffic Volume (vph)	390	93	109	15	121	315	99	588	13	233	940	524
Future Volume (vph)	390	93	109	15	121	315	99	588	13	233	940	524
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.97			0.99		1.00	1.00		1.00	1.00	0.90
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.92			0.91		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1659			1668		1770	3526		1770	3539	1431
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1659			1668		1770	3526		1770	3539	1431
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)	424	101	118	16	132	342	108	639	14	253	1022	570
RTOR Reduction (vph)	0	50	0	0	95	0	0	1	0	0	0	345
Lane Group Flow (vph)	424	169	0	0	395	0	108	652	0	253	1022	225
Confl. Peds. (#/hr)			39						3			26
Confl. Bikes (#/hr)			2			2						10
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	11.9	11.9			18.5		8.1	25.3		16.3	33.5	33.5
Effective Green, g (s)	11.9	11.9			18.5		8.1	25.3		16.3	33.5	33.5
Actuated g/C Ratio	0.14	0.14			0.22		0.10	0.30		0.19	0.39	0.39
Clearance Time (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0			2.0		2.0	3.0		2.0	3.0	3.0
Lane Grp Cap (vph)	480	232			363		168	1049		339	1394	563
v/s Ratio Prot	c0.12	0.10			c0.24		0.06	0.18		c0.14	c0.29	
v/s Ratio Perm												0.16
v/c Ratio	0.88	0.73			1.09		0.64	0.62		0.75	0.73	0.40
Uniform Delay, d1	35.9	35.0			33.2		37.1	25.7		32.4	21.9	18.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	16.9	9.3			72.5		6.2	2.8		7.6	3.4	2.1
Delay (s)	52.7	44.3			105.8		43.2	28.5		40.0	25.4	20.6
Level of Service	D	D			F		D	C		D	C	C
Approach Delay (s)		49.9			105.8			30.6			25.9	
Approach LOS		D			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	41.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues
1: Willow Rd & Gilbert Ave

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	18	96	88	127	5	262	121	757
v/c Ratio	0.14	0.41	0.59	0.53	0.01	0.19	0.14	0.51
Control Delay	45.6	46.2	63.8	50.1	4.0	3.4	4.0	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.6	46.2	63.8	50.1	4.0	3.4	4.0	6.5
Queue Length 50th (ft)	13	63	66	84	1	30	16	152
Queue Length 95th (ft)	29	93	113	137	3	44	32	207
Internal Link Dist (ft)		468		521		1923		337
Turn Bay Length (ft)	55		90		75		90	
Base Capacity (vph)	181	340	216	341	480	1406	858	1477
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	0.10	0.28	0.41	0.37	0.01	0.19	0.14	0.51

Intersection Summary

1: Willow Rd & Gilbert Ave

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	14	60	16	78	82	31	3	122	43	87	538	7
Future Volume (vph)	14	60	16	78	82	31	3	122	43	87	538	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.98		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.98	1.00		0.99	1.00		0.97	1.00	
Frt	1.00	0.97		1.00	0.96		1.00	0.96		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)	1747	1778		1733	1768		1760	1759		1717	1858	
Flt Permitted	0.53	1.00		0.64	1.00		0.33	1.00		0.60	1.00	
Satd. Flow (perm)	973	1778		1161	1768		603	1759		1080	1858	
Peak-hour factor, PHF	0.79	0.79	0.79	0.89	0.89	0.89	0.63	0.63	0.63	0.72	0.72	0.72
Adj. Flow (vph)	18	76	20	88	92	35	5	194	68	121	747	10
RTOR Reduction (vph)	0	9	0	0	12	0	0	8	0	0	0	0
Lane Group Flow (vph)	18	87	0	88	115	0	5	254	0	121	757	0
Confl. Peds. (#/hr)	6		9	9		6	8		17	17		8
Confl. Bikes (#/hr)			9						11			4
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)	15.4	15.4		15.4	15.4		95.4	95.4		95.4	95.4	
Effective Green, g (s)	15.4	15.4		15.4	15.4		95.4	95.4		95.4	95.4	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.80	0.80		0.80	0.80	
Clearance Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	124	228		148	226		479	1398		858	1477	
v/s Ratio Prot		0.05			0.06			0.14			c0.41	
v/s Ratio Perm	0.02			c0.08			0.01			0.11		
v/c Ratio	0.15	0.38		0.59	0.51		0.01	0.18		0.14	0.51	
Uniform Delay, d1	46.5	47.9		49.4	48.8		2.5	2.9		2.8	4.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	1.1		6.3	1.8		0.0	0.3		0.3	1.3	
Delay (s)	47.0	49.0		55.6	50.6		2.6	3.2		3.2	5.5	
Level of Service	D	D		E	D		A	A		A	A	
Approach Delay (s)		48.7			52.6			3.2			5.2	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues

2: Willow Rd & Middlefield Rd

Existing + Bridge Closure Conditions

Timing Plan: P.M. Peak

	↗	→	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	127	584	133	710	99	48	123	319	244	244	354
v/c Ratio	0.36	0.79	0.28	0.78	0.23	0.19	0.45	0.66	0.68	0.67	0.81
Control Delay	54.8	62.8	46.2	56.4	16.8	59.5	63.9	13.0	63.4	62.7	46.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.8	62.8	46.2	56.4	16.8	59.5	63.9	13.0	63.4	62.7	46.9
Queue Length 50th (ft)	123	313	109	374	20	42	113	0	247	246	216
Queue Length 95th (ft)	210	420	182	484	80	80	172	48	332	331	309
Internal Link Dist (ft)		465		339			466			185	
Turn Bay Length (ft)	270		120		65	75		110	150		65
Base Capacity (vph)	433	907	612	1170	531	408	429	580	516	525	570
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.64	0.22	0.61	0.19	0.12	0.29	0.55	0.47	0.46	0.62

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑↱		↰	↑↑↱	↱	↰	↑	↱	↰	↰↑	↱
Traffic Volume (vph)	130	511	14	128	671	106	39	100	258	353	57	297
Future Volume (vph)	130	511	14	128	671	106	39	100	258	353	57	297
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3	5.3	4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	0.91	0.91		1.00	0.91	0.91	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.92	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1610	3369		1770	3381	1400	1770	1863	1458	1681	1708	1531
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1610	3369		1770	3381	1400	1770	1863	1458	1681	1708	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.81	0.81	0.81	0.84	0.84	0.84
Adj. Flow (vph)	141	555	15	133	699	110	48	123	319	420	68	354
RTOR Reduction (vph)	0	1	0	0	1	55	0	0	272	0	0	114
Lane Group Flow (vph)	127	583	0	133	709	44	48	123	47	244	244	240
Confl. Peds. (#/hr)			5			9			28			11
Confl. Bikes (#/hr)			6			3			19			6
Turn Type	Split	NA		Split	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	2	2		3	3		1	1		4	4	
Permitted Phases						3			1			4
Actuated Green, G (s)	30.4	30.4		37.2	37.2	37.2	20.3	20.3	20.3	29.6	29.6	29.6
Effective Green, g (s)	30.4	30.4		37.2	37.2	37.2	20.3	20.3	20.3	29.6	29.6	29.6
Actuated g/C Ratio	0.22	0.22		0.27	0.27	0.27	0.15	0.15	0.15	0.22	0.22	0.22
Clearance Time (s)	5.3	5.3		5.3	5.3	5.3	4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	355	744		478	914	378	261	275	215	361	367	329
v/s Ratio Prot	0.08	c0.17		0.08	c0.21		0.03	c0.07		0.15	0.14	
v/s Ratio Perm						0.03			0.03			c0.16
v/c Ratio	0.36	0.78		0.28	0.78	0.12	0.18	0.45	0.22	0.68	0.66	0.73
Uniform Delay, d1	45.3	50.5		39.6	46.3	37.8	51.3	53.5	51.6	49.5	49.4	50.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	5.4		0.3	4.2	0.1	0.3	1.2	0.5	4.9	4.5	8.1
Delay (s)	45.9	55.9		39.9	50.5	37.9	51.7	54.6	52.1	54.5	53.9	58.3
Level of Service	D	E		D	D	D	D	D	D	D	D	E
Approach Delay (s)		54.1			47.7			52.7			55.9	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	52.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	137.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
3: Palo Alto Ave/Woodland Ave & Middlefield Rd

Existing + Bridge Closure Conditions
Timing Plan: P.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑			↱			✥		↰		↱
Traffic Volume (veh/h)	196	915	0	0	767	168	0	0	0	135	0	92
Future Volume (Veh/h)	196	915	0	0	767	168	0	0	0	135	0	92
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.25	0.25	0.25	0.73	0.73	0.73
Hourly flow rate (vph)	236	1102	0	0	834	183	0	0	0	185	0	126
Pedestrians					4			2			12	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					3.5			3.5			3.5	
Percent Blockage					0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		398										
pX, platoon unblocked				0.86			0.86	0.86	0.86	0.86	0.86	
vC, conflicting volume	1029			1104			2628	2605	557	1964	2514	938
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1029			802			2568	2542	168	1799	2436	938
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	64			100			100	100	100	0	100	52
cM capacity (veh/h)	663			704			4	15	727	31	17	263

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	NB 1	SB 1	SB 2
Volume Total	236	551	551	1017	0	185	126
Volume Left	236	0	0	0	0	185	0
Volume Right	0	0	0	183	0	0	126
cSH	663	1700	1700	1700	1700	31	263
Volume to Capacity	0.36	0.32	0.32	0.60	0.00	6.06	0.48
Queue Length 95th (ft)	40	0	0	0	0	Err	61
Control Delay (s)	13.4	0.0	0.0	0.0	0.0	Err	30.7
Lane LOS	B				A	F	D
Approach Delay (s)	2.4			0.0	0.0	5960.4	
Approach LOS					A	F	

Intersection Summary			
Average Delay	696.5		
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis

4: Middlefield Rd & Palo Alto Ave

Existing + Bridge Closure Conditions

Timing Plan: P.M. Peak

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↱		↰↱	
Traffic Volume (veh/h)	51	970	925	2	1	37
Future Volume (Veh/h)	51	970	925	2	1	37
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.89	0.89	0.69	0.69
Hourly flow rate (vph)	54	1032	1039	2	1	54
Pedestrians			2		14	
Lane Width (ft)			12.0		12.0	
Walking Speed (ft/s)			3.5		3.5	
Percent Blockage			0		1	
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)		892				
pX, platoon unblocked					0.82	
vC, conflicting volume	1055				2196	1054
vC1, stage 1 conf vol					1054	
vC2, stage 2 conf vol					1142	
vCu, unblocked vol	1055				2349	1054
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	92				99	80
cM capacity (veh/h)	651				193	271

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	54	1032	1041	55
Volume Left	54	0	0	1
Volume Right	0	0	2	54
cSH	651	1700	1700	269
Volume to Capacity	0.08	0.61	0.61	0.20
Queue Length 95th (ft)	7	0	0	19
Control Delay (s)	11.0	0.0	0.0	21.8
Lane LOS	B			C
Approach Delay (s)	0.5		0.0	21.8
Approach LOS				C

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		⇆	
Traffic Volume (veh/h)	1	50	104	100	18	3
Future Volume (Veh/h)	1	50	104	100	18	3
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.76	0.76	0.86	0.86	0.53	0.53
Hourly flow rate (vph)	1	66	121	116	34	6
Pedestrians					7	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	244				254	186
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	244				254	186
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				95	99
cM capacity (veh/h)	1313				729	850

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	67	237	40
Volume Left	1	0	34
Volume Right	0	116	6
cSH	1313	1700	745
Volume to Capacity	0.00	0.14	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.1	0.0	10.1
Lane LOS	A		B
Approach Delay (s)	0.1	0.0	10.1
Approach LOS			B

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 6: Woodland Ave & Pope St/Chaucer St

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	55	94	89
Average Queue (ft)	29	46	45
95th Queue (ft)	47	74	73
Link Distance (ft)	288	400	344
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	0	60	0	0	0	105	130	0	0	77	98
Future Volume (vph)	8	0	60	0	0	0	105	130	0	0	77	98
Peak Hour Factor	0.73	0.73	0.73	0.91	0.91	0.91	0.78	0.78	0.78	0.82	0.82	0.82
Hourly flow rate (vph)	11	0	82	0	0	0	135	167	0	0	94	120

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	93	0	302	214
Volume Left (vph)	11	0	135	0
Volume Right (vph)	82	0	0	120
Hadj (s)	-0.47	0.00	0.12	-0.30
Departure Headway (s)	4.6	5.2	4.5	4.2
Degree Utilization, x	0.12	0.00	0.37	0.25
Capacity (veh/h)	708	622	783	830
Control Delay (s)	8.2	8.2	10.1	8.5
Approach Delay (s)	8.2	0.0	10.1	8.5
Approach LOS	A	A	B	A

Intersection Summary			
Delay	9.3		
Level of Service	A		
Intersection Capacity Utilization	42.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
7: Palo Alto Ave & Chaucer St

Existing + Bridge Closure Conditions
Timing Plan: P.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (veh/h)	0	0	0	3	0	10	0	8	15	4	2	0
Future Volume (Veh/h)	0	0	0	3	0	10	0	8	15	4	2	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.83	0.83	0.83	0.83	0.83	0.83	0.50	0.50	0.50
Hourly flow rate (vph)	0	0	0	4	0	12	0	10	18	8	4	0
Pedestrians		3			12			16			20	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		0			1			2			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					517							
pX, platoon unblocked												
vC, conflicting volume	32			16			35	56	28	69	50	29
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	32			16			35	56	28	69	50	29
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	99	98	99	100	100
cM capacity (veh/h)	1550			1577			924	805	1019	847	811	1023

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	16	28	12
Volume Left	0	4	0	8
Volume Right	0	12	18	0
cSH	1700	1577	931	835
Volume to Capacity	0.00	0.00	0.03	0.01
Queue Length 95th (ft)	0	0	2	1
Control Delay (s)	0.0	1.8	9.0	9.4
Lane LOS		A	A	A
Approach Delay (s)	0.0	1.8	9.0	9.4
Approach LOS			A	A

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	21.5%	ICU Level of Service	A
Analysis Period (min)	15		

Queues
8: University Ave & Chaucer St

Existing + Bridge Closure Conditions
Timing Plan: P.M. Peak

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	20	48	266	575
v/c Ratio	0.05	0.12	0.19	0.44
Control Delay	14.9	13.7	4.9	6.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	14.9	13.7	4.9	6.8
Queue Length 50th (ft)	2	5	20	56
Queue Length 95th (ft)	20	31	80	237
Internal Link Dist (ft)	437	466	382	498
Turn Bay Length (ft)				
Base Capacity (vph)	1198	1076	1761	1644
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.02	0.04	0.15	0.35

Intersection Summary

HCM Signalized Intersection Capacity Analysis
8: University Ave & Chaucer St

Existing + Bridge Closure Conditions
Timing Plan: P.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	3	10	5	16	9	14	1	202	5	64	433	3
Future Volume (vph)	3	10	5	16	9	14	1	202	5	64	433	3
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			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.99			0.98			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.96			0.95			1.00			1.00	
Flt Protected		0.99			0.98			1.00			0.99	
Satd. Flow (prot)		1749			1702			1855			1849	
Flt Permitted		0.94			0.86			1.00			0.93	
Satd. Flow (perm)		1663			1487			1853			1732	
Peak-hour factor, PHF	0.90	0.90	0.90	0.81	0.81	0.81	0.78	0.78	0.78	0.87	0.87	0.87
Adj. Flow (vph)	3	11	6	20	11	17	1	259	6	74	498	3
RTOR Reduction (vph)	0	5	0	0	15	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	15	0	0	33	0	0	265	0	0	575	0
Confl. Peds. (#/hr)	3		4	4		3	8		3	3		8
Confl. Bikes (#/hr)			8			11			12			6
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)		5.0			5.0			24.8			24.8	
Effective Green, g (s)		5.0			5.0			24.8			24.8	
Actuated g/C Ratio		0.13			0.13			0.64			0.64	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			4.0			4.0	
Lane Grp Cap (vph)		214			191			1184			1107	
v/s Ratio Prot												
v/s Ratio Perm		0.01			c0.02			0.14			c0.33	
v/c Ratio		0.07			0.17			0.22			0.52	
Uniform Delay, d1		14.9			15.1			2.9			3.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.4			0.1			0.5	
Delay (s)		15.0			15.5			3.1			4.3	
Level of Service		B			B			A			A	
Approach Delay (s)		15.0			15.5			3.1			4.3	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	4.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	38.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

9: University Ave & Woodland Ave/Scofield Ave

	↗	→	←	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	547	296	568	383	795	147	518	398
v/c Ratio	0.87	0.87	0.99	1.11	0.69	0.64	0.56	0.61
Control Delay	51.9	57.4	56.4	117.9	30.2	48.9	30.7	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.9	57.4	56.4	117.9	30.2	48.9	30.7	7.3
Queue Length 50th (ft)	156	143	~216	~258	197	80	128	0
Queue Length 95th (ft)	#238	#285	#419	#431	284	134	178	71
Internal Link Dist (ft)		498	512		536		443	
Turn Bay Length (ft)				160		210		
Base Capacity (vph)	648	350	573	345	1155	334	1022	677
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	0.84	0.85	0.99	1.11	0.69	0.44	0.51	0.59

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.

9: University Ave & Woodland Ave/Scofield Ave

Timing Plan: P.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↱			✥		↰	↑↱		↰	↑↑	↱
Traffic Volume (vph)	503	153	120	11	67	444	352	708	23	135	477	366
Future Volume (vph)	503	153	120	11	67	444	352	708	23	135	477	366
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.97			1.00		1.00	1.00		1.00	1.00	0.86
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.93			0.89		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1686			1647		1770	3520		1770	3539	1363
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1686			1647		1770	3520		1770	3539	1363
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)	547	166	130	12	73	483	383	770	25	147	518	398
RTOR Reduction (vph)	0	32	0	0	220	0	0	3	0	0	0	293
Lane Group Flow (vph)	547	264	0	0	348	0	383	792	0	147	518	105
Confl. Peds. (#/hr)			47						1			40
Confl. Bikes (#/hr)			4						4			7
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	16.4	16.4			19.3		17.6	29.5		11.8	23.7	23.7
Effective Green, g (s)	16.4	16.4			19.3		17.6	29.5		11.8	23.7	23.7
Actuated g/C Ratio	0.18	0.18			0.21		0.20	0.33		0.13	0.26	0.26
Clearance Time (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0			2.0		2.0	3.0		2.0	3.0	3.0
Lane Grp Cap (vph)	625	307			353		346	1153		232	931	358
v/s Ratio Prot	c0.16	0.16			c0.21		c0.22	c0.23		0.08	0.15	
v/s Ratio Perm												0.08
v/c Ratio	0.88	0.86			0.99		1.11	0.69		0.63	0.56	0.29
Uniform Delay, d1	35.8	35.7			35.2		36.2	26.2		37.1	28.6	26.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.6	20.4			43.6		80.4	3.3		4.1	2.4	2.1
Delay (s)	48.4	56.1			78.9		116.6	29.6		41.2	31.0	28.5
Level of Service	D	E			E		F	C		D	C	C
Approach Delay (s)		51.1			78.9			57.9			31.5	
Approach LOS		D			E			E			C	

Intersection Summary			
HCM 2000 Control Delay	51.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	96.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Appendix D – Mitigation Measures Synchro Reports

- HCM Delay and LOS Reports
- 95th Percentile Queue Length Reports

Queues
1: Willow Rd & Gilbert Ave

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	43	134	353	291	5	899	59	908
v/c Ratio	0.17	0.22	0.93	0.49	0.04	0.82	0.41	0.81
Control Delay	34.6	34.4	78.0	37.7	11.0	17.9	28.7	31.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.6	34.4	78.0	37.7	11.0	17.9	28.7	31.9
Queue Length 50th (ft)	28	88	319	196	1	202	31	712
Queue Length 95th (ft)	48	112	378	237	m2	258	81	953
Internal Link Dist (ft)		468		521		1923		337
Turn Bay Length (ft)	55		90		75		90	
Base Capacity (vph)	284	678	418	653	138	1102	144	1118
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	0.15	0.20	0.84	0.45	0.04	0.82	0.41	0.81

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

1: Willow Rd & Gilbert Ave

Timing Plan: A.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	32	91	8	279	135	95	4	692	72	56	858	5
Future Volume (vph)	32	91	8	279	135	95	4	692	72	56	858	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.97	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.94		1.00	0.99		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)	1764	1830		1719	1721		1770	1828		1770	1861	
Flt Permitted	0.41	1.00		0.63	1.00		0.12	1.00		0.13	1.00	
Satd. Flow (perm)	769	1830		1133	1721		230	1828		240	1861	
Peak-hour factor, PHF	0.74	0.74	0.74	0.79	0.79	0.79	0.85	0.85	0.85	0.95	0.95	0.95
Adj. Flow (vph)	43	123	11	353	171	120	5	814	85	59	903	5
RTOR Reduction (vph)	0	2	0	0	18	0	0	2	0	0	0	0
Lane Group Flow (vph)	43	132	0	353	273	0	5	897	0	59	908	0
Confl. Peds. (#/hr)	2		11	11		2	7		8	8		7
Confl. Bikes (#/hr)			5			9			10			20
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)	50.6	50.6		50.6	50.6		90.2	90.2		90.2	90.2	
Effective Green, g (s)	50.6	50.6		50.6	50.6		90.2	90.2		90.2	90.2	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.60	0.60		0.60	0.60	
Clearance Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	259	617		382	580		138	1099		144	1119	
v/s Ratio Prot		0.07			0.16			c0.49			0.49	
v/s Ratio Perm	0.06			c0.31			0.02			0.25		
v/c Ratio	0.17	0.21		0.92	0.47		0.04	0.82		0.41	0.81	
Uniform Delay, d1	34.9	35.5		47.9	39.2		12.2	23.4		15.8	23.3	
Progression Factor	1.00	1.00		1.00	1.00		0.72	0.50		1.00	1.00	
Incremental Delay, d2	0.3	0.2		27.6	0.6		0.3	4.8		8.4	6.4	
Delay (s)	35.2	35.7		75.5	39.8		9.1	16.6		24.2	29.7	
Level of Service	D	D		E	D		A	B		C	C	
Approach Delay (s)		35.6			59.3			16.6			29.4	
Approach LOS		D			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	32.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Queues
2: Willow Rd & Middlefield Rd

Mitigation Measures - Option 1
Timing Plan: A.M. Peak

	↗	→	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	226	465	94	478	180	50	313	162	342	348	499
v/c Ratio	0.83	0.82	0.31	0.83	0.60	0.15	0.91	0.47	0.60	0.60	0.80
Control Delay	84.2	72.2	57.0	73.0	38.3	51.7	89.4	29.0	41.1	41.1	30.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.2	72.2	57.0	73.0	38.3	51.7	89.4	29.0	41.1	41.1	30.8
Queue Length 50th (ft)	234	240	81	247	93	41	300	61	260	264	169
Queue Length 95th (ft)	#371	308	131	300	173	68	340	99	m373	m380	m#467
Internal Link Dist (ft)		465		339			466			185	
Turn Bay Length (ft)	270		120		65	75		110	150		65
Base Capacity (vph)	290	604	318	606	313	345	363	356	572	582	623
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.77	0.30	0.79	0.58	0.14	0.86	0.46	0.60	0.60	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.

2: Willow Rd & Middlefield Rd

Timing Plan: A.M. Peak

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑↱		↰	↑↱	↱	↰	↑	↱	↰	↰	↱
Traffic Volume (vph)	283	322	17	81	394	172	38	238	123	539	102	464
Future Volume (vph)	283	322	17	81	394	172	38	238	123	539	102	464
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3	5.3	4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	0.91	0.91		1.00	0.91	0.91	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	1.00	0.92	1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.99	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1610	3333		1770	3360	1354	1770	1863	1459	1681	1711	1484
Flt Permitted	0.95	0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1610	3333		1770	3360	1354	1770	1863	1459	1681	1711	1484
Peak-hour factor, PHF	0.90	0.90	0.90	0.86	0.86	0.86	0.76	0.76	0.76	0.93	0.93	0.93
Adj. Flow (vph)	314	358	19	94	458	200	50	313	162	580	110	499
RTOR Reduction (vph)	0	2	0	0	2	70	0	0	73	0	0	119
Lane Group Flow (vph)	226	463	0	94	476	110	50	313	89	342	348	380
Confl. Peds. (#/hr)			1			22			31			23
Confl. Bikes (#/hr)			6			9			16			28
Turn Type	Split	NA		Split	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	2	2		3	3		1	1		4	4	
Permitted Phases						3			1			4
Actuated Green, G (s)	25.5	25.5		25.6	25.6	25.6	27.8	27.8	27.8	51.1	51.1	51.1
Effective Green, g (s)	25.5	25.5		25.6	25.6	25.6	27.8	27.8	27.8	51.1	51.1	51.1
Actuated g/C Ratio	0.17	0.17		0.17	0.17	0.17	0.19	0.19	0.19	0.34	0.34	0.34
Clearance Time (s)	5.3	5.3		5.3	5.3	5.3	4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	273	566		302	573	231	328	345	270	572	582	505
v/s Ratio Prot	c0.14	0.14		0.05	c0.14		0.03	c0.17		0.20	0.20	
v/s Ratio Perm						0.08			0.06			c0.26
v/c Ratio	0.83	0.82		0.31	0.83	0.47	0.15	0.91	0.33	0.60	0.60	0.75
Uniform Delay, d1	60.1	60.0		54.5	60.1	56.1	51.2	59.8	53.0	40.9	40.9	43.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.89	0.83
Incremental Delay, d2	18.3	9.0		0.6	10.0	1.5	0.2	26.3	0.7	2.6	2.5	5.7
Delay (s)	78.4	69.0		55.1	70.1	57.7	51.4	86.1	53.8	39.2	39.1	42.1
Level of Service	E	E		E	E	E	D	F	D	D	D	D
Approach Delay (s)		72.1			65.2			72.8			40.4	
Approach LOS		E			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	58.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
3: Palo Alto Ave/Woodland Ave & Middlefield Rd

Mitigation Measures - Option 1
Timing Plan: A.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑			↱			✣		↰		↱
Traffic Volume (veh/h)	84	893	0	0	501	38	0	0	0	51	0	147
Future Volume (Veh/h)	84	893	0	0	501	38	0	0	0	51	0	147
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.92	0.92	0.92	0.25	0.25	0.25	0.99	0.99	0.99
Hourly flow rate (vph)	87	921	0	0	545	41	0	0	0	52	0	148
Pedestrians					6			6			5	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					3.5			3.5			3.5	
Percent Blockage					1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		398										
pX, platoon unblocked				0.92			0.92	0.92	0.92	0.92	0.92	
vC, conflicting volume	591			927			1814	1692	472	1211	1672	570
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	591			752			1715	1582	260	1060	1560	570
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	91			100			100	100	100	65	100	68
cM capacity (veh/h)	976			782			34	90	674	150	92	462

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	NB 1	SB 1	SB 2
Volume Total	87	460	460	586	0	52	148
Volume Left	87	0	0	0	0	52	0
Volume Right	0	0	0	41	0	0	148
cSH	976	1700	1700	1700	1700	150	462
Volume to Capacity	0.09	0.27	0.27	0.34	0.00	0.35	0.32
Queue Length 95th (ft)	7	0	0	0	0	36	34
Control Delay (s)	9.0	0.0	0.0	0.0	0.0	41.1	16.4
Lane LOS	A				A	E	C
Approach Delay (s)	0.8			0.0	0.0	22.8	
Approach LOS					A	C	

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

4: Middlefield Rd & Palo Alto Ave

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↱		Y	
Traffic Volume (veh/h)	24	925	507	5	2	32
Future Volume (Veh/h)	24	925	507	5	2	32
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.95	0.95	0.92	0.92
Hourly flow rate (vph)	26	984	534	5	2	35
Pedestrians		2	4		10	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		3.5	3.5		3.5	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)		892				
pX, platoon unblocked					0.86	
vC, conflicting volume	549				1586	548
vC1, stage 1 conf vol					546	
vC2, stage 2 conf vol					1040	
vCu, unblocked vol	549				1601	548
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	97				99	93
cM capacity (veh/h)	1011				276	530

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	26	984	539	37
Volume Left	26	0	0	2
Volume Right	0	0	5	35
cSH	1011	1700	1700	505
Volume to Capacity	0.03	0.58	0.32	0.07
Queue Length 95th (ft)	2	0	0	6
Control Delay (s)	8.7	0.0	0.0	12.7
Lane LOS	A			B
Approach Delay (s)	0.2		0.0	12.7
Approach LOS				B

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		

5: Pope St & Central Ave

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Volume (veh/h)	2	12	37	17	13	2
Future Volume (Veh/h)	2	12	37	17	13	2
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.72	0.72	0.84	0.84
Hourly flow rate (vph)	2	13	51	24	15	2
Pedestrians					8	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	83				88	71
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	83				88	71
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1503				905	984

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	15	75	17
Volume Left	2	0	15
Volume Right	0	24	2
cSH	1503	1700	913
Volume to Capacity	0.00	0.04	0.02
Queue Length 95th (ft)	0	0	1
Control Delay (s)	1.0	0.0	9.0
Lane LOS	A		A
Approach Delay (s)	1.0	0.0	9.0
Approach LOS			A

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	15.7%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 6: Woodland Ave & Pope St/Chaucer St

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	47	56	72
Average Queue (ft)	18	25	39
95th Queue (ft)	43	45	61
Link Distance (ft)	283	395	346
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

6: Woodland Ave & Pope St/Chaucer St

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	25	0	4	0	0	0	20	58	0	0	96	32
Future Volume (vph)	25	0	4	0	0	0	20	58	0	0	96	32
Peak Hour Factor	0.88	0.88	0.88	0.82	0.82	0.82	0.79	0.79	0.79	0.94	0.94	0.94
Hourly flow rate (vph)	28	0	5	0	0	0	25	73	0	0	102	34

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	33	0	98	136
Volume Left (vph)	28	0	25	0
Volume Right (vph)	5	0	0	34
Hadj (s)	0.11	0.00	0.09	-0.12
Departure Headway (s)	4.5	4.4	4.2	4.0
Degree Utilization, x	0.04	0.00	0.11	0.15
Capacity (veh/h)	756	776	838	895
Control Delay (s)	7.7	7.4	7.7	7.7
Approach Delay (s)	7.7	0.0	7.7	7.7
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.7		
Level of Service	A		
Intersection Capacity Utilization	26.7%	ICU Level of Service	A
Analysis Period (min)	15		

7: Palo Alto Ave & Chaucer St

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	0	0	0	3	0	1	0	2	6	2	2	0
Future Volume (Veh/h)	0	0	0	3	0	1	0	2	6	2	2	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.85	0.85	0.85	0.92	0.92	0.92	0.25	0.25	0.25
Hourly flow rate (vph)	0	0	0	4	0	1	0	2	7	8	8	0
Pedestrians		2			3			2			8	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		0			0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					517							
pX, platoon unblocked												
vC, conflicting volume	9			2			16	19	5	28	18	10
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	9			2			16	19	5	28	18	10
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	99	99	100
cM capacity (veh/h)	1599			1617			979	864	1073	955	865	1060

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	5	9	16
Volume Left	0	4	0	8
Volume Right	0	1	7	0
cSH	1700	1617	1018	908
Volume to Capacity	0.00	0.00	0.01	0.02
Queue Length 95th (ft)	0	0	1	1
Control Delay (s)	0.0	5.8	8.6	9.0
Lane LOS		A	A	A
Approach Delay (s)	0.0	5.8	8.6	9.0
Approach LOS			A	A

Intersection Summary			
Average Delay	8.4		
Intersection Capacity Utilization	16.6%	ICU Level of Service	A
Analysis Period (min)	15		

Queues
8: University Ave & Chaucer St

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	8	71	394	766
v/c Ratio	0.03	0.23	0.26	0.50
Control Delay	20.6	13.0	2.8	4.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.6	13.0	2.8	4.5
Queue Length 50th (ft)	1	3	31	81
Queue Length 95th (ft)	14	24	70	174
Internal Link Dist (ft)	437	466	382	498
Turn Bay Length (ft)				
Base Capacity (vph)	987	986	1787	1781
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.01	0.07	0.22	0.43

Intersection Summary

HCM Signalized Intersection Capacity Analysis
8: University Ave & Chaucer St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	2	2	4	7	2	40	1	361	1	7	674	1
Future Volume (vph)	2	2	4	7	2	40	1	361	1	7	674	1
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			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.94			0.94			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.93			0.89			1.00			1.00	
Flt Protected		0.99			0.99			1.00			1.00	
Satd. Flow (prot)		1619			1546			1862			1861	
Flt Permitted		0.92			0.95			1.00			1.00	
Satd. Flow (perm)		1500			1476			1860			1855	
Peak-hour factor, PHF	0.90	0.90	0.90	0.69	0.69	0.69	0.92	0.92	0.92	0.89	0.89	0.89
Adj. Flow (vph)	2	2	4	10	3	58	1	392	1	8	757	1
RTOR Reduction (vph)	0	4	0	0	54	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	4	0	0	17	0	0	394	0	0	766	0
Confl. Peds. (#/hr)	6		4	4		6	5		3	3		5
Confl. Bikes (#/hr)			18			10			7			23
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)		3.5			3.5			33.3			33.3	
Effective Green, g (s)		3.5			3.5			33.3			33.3	
Actuated g/C Ratio		0.08			0.08			0.73			0.73	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			4.0			4.0	
Lane Grp Cap (vph)		114			112			1352			1348	
v/s Ratio Prot												
v/s Ratio Perm		0.00			c0.01			0.21			c0.41	
v/c Ratio		0.04			0.16			0.29			0.57	
Uniform Delay, d1		19.6			19.8			2.2			2.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.7			0.2			0.7	
Delay (s)		19.7			20.4			2.3			3.6	
Level of Service		B			C			A			A	
Approach Delay (s)		19.7			20.4			2.3			3.6	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	4.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	45.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

	↗	→	←	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	424	219	490	108	653	253	1022	570
v/c Ratio	0.88	0.78	1.07	0.57	0.62	0.75	0.72	0.62
Control Delay	57.4	45.9	89.9	47.1	29.3	45.6	25.6	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	45.9	89.9	47.1	29.3	45.6	25.6	5.3
Queue Length 50th (ft)	115	84	~253	56	153	128	239	0
Queue Length 95th (ft)	#195	#194	#442	103	231	192	329	71
Internal Link Dist (ft)		498	512		536		443	
Turn Bay Length (ft)				160		210		
Base Capacity (vph)	484	284	457	249	1051	458	1420	915
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	0.88	0.77	1.07	0.43	0.62	0.55	0.72	0.62

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.

9: University Ave & Woodland Ave/Scofield Ave

Timing Plan: A.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↱			✥		↰	↑↱		↰	↑↑	↱
Traffic Volume (vph)	390	93	109	15	121	315	99	588	13	233	940	524
Future Volume (vph)	390	93	109	15	121	315	99	588	13	233	940	524
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.97			0.99		1.00	1.00		1.00	1.00	0.90
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.92			0.91		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1659			1668		1770	3526		1770	3539	1431
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1659			1668		1770	3526		1770	3539	1431
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)	424	101	118	16	132	342	108	639	14	253	1022	570
RTOR Reduction (vph)	0	50	0	0	95	0	0	1	0	0	0	345
Lane Group Flow (vph)	424	169	0	0	395	0	108	652	0	253	1022	225
Confl. Peds. (#/hr)			39						3			26
Confl. Bikes (#/hr)			2			2						10
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	11.9	11.9			18.5		8.1	25.3		16.3	33.5	33.5
Effective Green, g (s)	11.9	11.9			18.5		8.1	25.3		16.3	33.5	33.5
Actuated g/C Ratio	0.14	0.14			0.22		0.10	0.30		0.19	0.39	0.39
Clearance Time (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0			2.0		2.0	3.0		2.0	3.0	3.0
Lane Grp Cap (vph)	480	232			363		168	1049		339	1394	563
v/s Ratio Prot	c0.12	0.10			c0.24		0.06	0.18		c0.14	c0.29	
v/s Ratio Perm												0.16
v/c Ratio	0.88	0.73			1.09		0.64	0.62		0.75	0.73	0.40
Uniform Delay, d1	35.9	35.0			33.2		37.1	25.7		32.4	21.9	18.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	16.9	9.3			72.5		6.2	2.8		7.6	3.4	2.1
Delay (s)	52.7	44.3			105.8		43.2	28.5		40.0	25.4	20.6
Level of Service	D	D			F		D	C		D	C	C
Approach Delay (s)		49.9			105.8			30.6			25.9	
Approach LOS		D			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	41.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues

1: Willow Rd & Gilbert Ave

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	18	96	188	127	5	262	121	757
v/c Ratio	0.08	0.27	0.78	0.35	0.01	0.20	0.16	0.56
Control Delay	36.3	35.6	66.6	37.0	7.0	6.0	6.9	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.3	35.6	66.6	37.0	7.0	6.0	6.9	10.8
Queue Length 50th (ft)	12	56	140	75	1	49	25	235
Queue Length 95th (ft)	26	81	201	118	4	67	47	302
Internal Link Dist (ft)		468		521		1923		337
Turn Bay Length (ft)	55		90		75		90	
Base Capacity (vph)	315	519	350	518	399	1285	777	1349
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	0.54	0.25	0.01	0.20	0.16	0.56

Intersection Summary

1: Willow Rd & Gilbert Ave

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	14	60	16	167	82	31	3	122	43	87	538	7
Future Volume (vph)	14	60	16	167	82	31	3	122	43	87	538	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.98		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.98	1.00		1.00	1.00		0.97	1.00	
Frt	1.00	0.97		1.00	0.96		1.00	0.96		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)	1747	1782		1732	1768		1762	1759		1718	1858	
Flt Permitted	0.60	1.00		0.67	1.00		0.29	1.00		0.59	1.00	
Satd. Flow (perm)	1099	1782		1222	1768		547	1759		1068	1858	
Peak-hour factor, PHF	0.79	0.79	0.79	0.89	0.89	0.89	0.63	0.63	0.63	0.72	0.72	0.72
Adj. Flow (vph)	18	76	20	188	92	35	5	194	68	121	747	10
RTOR Reduction (vph)	0	9	0	0	13	0	0	8	0	0	0	0
Lane Group Flow (vph)	18	87	0	188	114	0	5	254	0	121	757	0
Confl. Peds. (#/hr)	6		9	9		6	8		17	17		8
Confl. Bikes (#/hr)			9						11			4
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)	23.6	23.6		23.6	23.6		87.2	87.2		87.2	87.2	
Effective Green, g (s)	23.6	23.6		23.6	23.6		87.2	87.2		87.2	87.2	
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.73	0.73		0.73	0.73	
Clearance Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	216	350		240	347		397	1278		776	1350	
v/s Ratio Prot		0.05			0.06			0.14			c0.41	
v/s Ratio Perm	0.02			c0.15			0.01			0.11		
v/c Ratio	0.08	0.25		0.78	0.33		0.01	0.20		0.16	0.56	
Uniform Delay, d1	39.4	40.7		45.8	41.4		4.5	5.2		5.1	7.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.4		15.3	0.6		0.1	0.3		0.4	1.7	
Delay (s)	39.5	41.1		61.1	42.0		4.6	5.6		5.5	9.2	
Level of Service	D	D		E	D		A	A		A	A	
Approach Delay (s)		40.8			53.4			5.6			8.7	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queues
2: Willow Rd & Middlefield Rd

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	127	584	133	710	99	48	123	319	295	299	354
v/c Ratio	0.37	0.81	0.30	0.82	0.24	0.19	0.46	0.66	0.73	0.73	0.77
Control Delay	55.9	64.9	49.3	61.4	17.8	60.2	65.0	13.2	63.8	63.6	46.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.9	64.9	49.3	61.4	17.8	60.2	65.0	13.2	63.8	63.6	46.2
Queue Length 50th (ft)	126	322	114	390	20	43	116	0	307	311	238
Queue Length 95th (ft)	213	423	190	#508	83	80	172	48	390	392	323
Internal Link Dist (ft)		465		339			466			185	
Turn Bay Length (ft)	270		120		65	75		110	150		65
Base Capacity (vph)	412	864	532	1017	471	385	406	565	559	567	591
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.68	0.25	0.70	0.21	0.12	0.30	0.56	0.53	0.53	0.60

Intersection Summary

\#   95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: Willow Rd & Middlefield Rd

Mitigation Measures - Option 1

Timing Plan: P.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑↱		↰	↑↑↱	↱	↰	↑	↱	↰	↰	↱
Traffic Volume (vph)	130	511	14	128	671	106	39	100	258	442	57	297
Future Volume (vph)	130	511	14	128	671	106	39	100	258	442	57	297
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3	5.3	4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	0.91	0.91		1.00	0.91	0.91	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.92	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1610	3369		1770	3381	1399	1770	1863	1456	1681	1704	1532
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	1610	3369		1770	3381	1399	1770	1863	1456	1681	1704	1532
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.81	0.81	0.81	0.84	0.84	0.84
Adj. Flow (vph)	141	555	15	133	699	110	48	123	319	526	68	354
RTOR Reduction (vph)	0	1	0	0	1	56	0	0	273	0	0	93
Lane Group Flow (vph)	127	583	0	133	709	43	48	123	46	295	299	261
Confl. Peds. (#/hr)			5			9			28			11
Confl. Bikes (#/hr)			6			3			19			6
Turn Type	Split	NA		Split	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	2	2		3	3		1	1		4	4	
Permitted Phases						3			1			4
Actuated Green, G (s)	30.6	30.6		36.2	36.2	36.2	20.4	20.4	20.4	34.1	34.1	34.1
Effective Green, g (s)	30.6	30.6		36.2	36.2	36.2	20.4	20.4	20.4	34.1	34.1	34.1
Actuated g/C Ratio	0.22	0.22		0.26	0.26	0.26	0.14	0.14	0.14	0.24	0.24	0.24
Clearance Time (s)	5.3	5.3		5.3	5.3	5.3	4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	348	729		453	866	358	255	268	210	405	411	369
v/s Ratio Prot	0.08	c0.17		0.08	c0.21		0.03	c0.07		c0.18	0.18	
v/s Ratio Perm						0.03			0.03			0.17
v/c Ratio	0.36	0.80		0.29	0.82	0.12	0.19	0.46	0.22	0.73	0.73	0.71
Uniform Delay, d1	47.1	52.5		42.3	49.5	40.3	53.2	55.4	53.4	49.3	49.3	49.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	6.3		0.4	6.1	0.2	0.4	1.2	0.5	6.4	6.3	6.1
Delay (s)	47.7	58.7		42.6	55.6	40.5	53.5	56.6	53.9	55.8	55.6	55.1
Level of Service	D	E		D	E	D	D	E	D	E	E	E
Approach Delay (s)		56.8			52.1			54.6			55.5	
Approach LOS		E			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	54.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	141.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
3: Palo Alto Ave/Woodland Ave & Middlefield Rd

Mitigation Measures - Option 1
Timing Plan: P.M. Peak

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑			↱			✥		↰		↱
Traffic Volume (veh/h)	196	1004	0	0	767	168	0	0	0	48	0	92
Future Volume (Veh/h)	196	1004	0	0	767	168	0	0	0	48	0	92
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.25	0.25	0.25	0.73	0.73	0.73
Hourly flow rate (vph)	236	1210	0	0	834	183	0	0	0	66	0	126
Pedestrians					4			2			12	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					3.5			3.5			3.5	
Percent Blockage					0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		398										
pX, platoon unblocked				0.86			0.86	0.86	0.86	0.86	0.86	
vC, conflicting volume	1029			1212			2736	2713	611	2018	2622	938
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1029			919			2692	2666	220	1858	2559	938
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	64			100			100	100	100	0	100	52
cM capacity (veh/h)	663			633			3	12	670	27	14	263

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	NB 1	SB 1	SB 2
Volume Total	236	605	605	1017	0	66	126
Volume Left	236	0	0	0	0	66	0
Volume Right	0	0	0	183	0	0	126
cSH	663	1700	1700	1700	1700	27	263
Volume to Capacity	0.36	0.36	0.36	0.60	0.00	2.40	0.48
Queue Length 95th (ft)	40	0	0	0	0	198	61
Control Delay (s)	13.4	0.0	0.0	0.0	0.0	942.4	30.7
Lane LOS	B				A	F	D
Approach Delay (s)	2.2			0.0	0.0	344.1	
Approach LOS					A	F	

Intersection Summary			
Average Delay	26.1		
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↱		Y	
Traffic Volume (veh/h)	51	970	925	2	1	37
Future Volume (Veh/h)	51	970	925	2	1	37
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.89	0.89	0.69	0.69
Hourly flow rate (vph)	54	1032	1039	2	1	54
Pedestrians			2		14	
Lane Width (ft)			12.0		12.0	
Walking Speed (ft/s)			3.5		3.5	
Percent Blockage			0		1	
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)		892				
pX, platoon unblocked					0.82	
vC, conflicting volume	1055				2196	1054
vC1, stage 1 conf vol					1054	
vC2, stage 2 conf vol					1142	
vCu, unblocked vol	1055				2353	1054
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	92				99	80
cM capacity (veh/h)	651				192	271

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	54	1032	1041	55
Volume Left	54	0	0	1
Volume Right	0	0	2	54
cSH	651	1700	1700	269
Volume to Capacity	0.08	0.61	0.61	0.20
Queue Length 95th (ft)	7	0	0	19
Control Delay (s)	11.0	0.0	0.0	21.8
Lane LOS	B			C
Approach Delay (s)	0.5		0.0	21.8
Approach LOS				C

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

5: Pope St & Central Ave

Timing Plan: P.M. Peak

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Volume (veh/h)	1	1	104	100	1	3
Future Volume (Veh/h)	1	1	104	100	1	3
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.76	0.76	0.86	0.86	0.53	0.53
Hourly flow rate (vph)	1	1	121	116	2	6
Pedestrians					7	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	244				189	186
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	244				189	186
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1313				794	850

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	2	237	8
Volume Left	1	0	2
Volume Right	0	116	6
cSH	1313	1700	836
Volume to Capacity	0.00	0.14	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s)	3.9	0.0	9.3
Lane LOS	A		A
Approach Delay (s)	3.9	0.0	9.3
Approach LOS			A

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 6: Woodland Ave & Pope St/Chaucer St

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	64	94	80
Average Queue (ft)	31	46	41
95th Queue (ft)	53	77	67
Link Distance (ft)	288	400	344
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

6: Woodland Ave & Pope St/Chaucer St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	0	60	0	0	0	105	130	0	0	45	98
Future Volume (vph)	8	0	60	0	0	0	105	130	0	0	45	98
Peak Hour Factor	0.73	0.73	0.73	0.91	0.91	0.91	0.78	0.78	0.78	0.82	0.82	0.82
Hourly flow rate (vph)	11	0	82	0	0	0	135	167	0	0	55	120

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	93	0	302	175
Volume Left (vph)	11	0	135	0
Volume Right (vph)	82	0	0	120
Hadj (s)	-0.47	0.00	0.12	-0.38
Departure Headway (s)	4.5	5.1	4.4	4.1
Degree Utilization, x	0.12	0.00	0.37	0.20
Capacity (veh/h)	725	639	793	844
Control Delay (s)	8.1	8.1	10.0	8.1
Approach Delay (s)	8.1	0.0	10.0	8.1
Approach LOS	A	A	B	A

Intersection Summary			
Delay	9.1		
Level of Service	A		
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis

Mitigation Measures - Option 1

7: Palo Alto Ave & Chaucer St

Timing Plan: P.M. Peak

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (veh/h)	0	0	0	3	0	10	0	8	15	4	2	0
Future Volume (Veh/h)	0	0	0	3	0	10	0	8	15	4	2	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.83	0.83	0.83	0.83	0.83	0.83	0.50	0.50	0.50
Hourly flow rate (vph)	0	0	0	4	0	12	0	10	18	8	4	0
Pedestrians		3			12			16			20	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		0			1			2			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					517							
pX, platoon unblocked												
vC, conflicting volume	32			16			35	56	28	69	50	29
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	32			16			35	56	28	69	50	29
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	99	98	99	100	100
cM capacity (veh/h)	1550			1577			924	805	1019	847	811	1023

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	16	28	12
Volume Left	0	4	0	8
Volume Right	0	12	18	0
cSH	1700	1577	931	835
Volume to Capacity	0.00	0.00	0.03	0.01
Queue Length 95th (ft)	0	0	2	1
Control Delay (s)	0.0	1.8	9.0	9.4
Lane LOS		A	A	A
Approach Delay (s)	0.0	1.8	9.0	9.4
Approach LOS			A	A

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	21.5%	ICU Level of Service	A
Analysis Period (min)	15		

Queues
8: University Ave & Chaucer St

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	20	48	266	575
v/c Ratio	0.05	0.12	0.19	0.44
Control Delay	14.9	13.7	4.9	6.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	14.9	13.7	4.9	6.8
Queue Length 50th (ft)	2	5	20	56
Queue Length 95th (ft)	20	31	80	237
Internal Link Dist (ft)	437	466	382	498
Turn Bay Length (ft)				
Base Capacity (vph)	1198	1076	1761	1644
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.02	0.04	0.15	0.35

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	3	10	5	16	9	14	1	202	5	64	433	3
Future Volume (vph)	3	10	5	16	9	14	1	202	5	64	433	3
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			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.99			0.98			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.96			0.95			1.00			1.00	
Flt Protected		0.99			0.98			1.00			0.99	
Satd. Flow (prot)		1749			1702			1855			1849	
Flt Permitted		0.94			0.86			1.00			0.93	
Satd. Flow (perm)		1663			1487			1853			1732	
Peak-hour factor, PHF	0.90	0.90	0.90	0.81	0.81	0.81	0.78	0.78	0.78	0.87	0.87	0.87
Adj. Flow (vph)	3	11	6	20	11	17	1	259	6	74	498	3
RTOR Reduction (vph)	0	5	0	0	15	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	15	0	0	33	0	0	265	0	0	575	0
Confl. Peds. (#/hr)	3		4	4		3	8		3	3		8
Confl. Bikes (#/hr)			8			11			12			6
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)		5.0			5.0			24.8			24.8	
Effective Green, g (s)		5.0			5.0			24.8			24.8	
Actuated g/C Ratio		0.13			0.13			0.64			0.64	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			4.0			4.0	
Lane Grp Cap (vph)		214			191			1184			1107	
v/s Ratio Prot												
v/s Ratio Perm		0.01			c0.02			0.14			c0.33	
v/c Ratio		0.07			0.17			0.22			0.52	
Uniform Delay, d1		14.9			15.1			2.9			3.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.4			0.1			0.5	
Delay (s)		15.0			15.5			3.1			4.3	
Level of Service		B			B			A			A	
Approach Delay (s)		15.0			15.5			3.1			4.3	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	4.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	38.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

9: University Ave & Woodland Ave/Scofield Ave

Timing Plan: P.M. Peak

	↗	→	←	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	547	296	568	383	795	147	518	398
v/c Ratio	0.87	0.87	0.99	1.11	0.69	0.64	0.56	0.61
Control Delay	51.9	57.4	56.4	117.9	30.2	48.9	30.7	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.9	57.4	56.4	117.9	30.2	48.9	30.7	7.3
Queue Length 50th (ft)	156	143	~216	~258	197	80	128	0
Queue Length 95th (ft)	#238	#285	#419	#431	284	134	178	71
Internal Link Dist (ft)		498	512		536		443	
Turn Bay Length (ft)				160		210		
Base Capacity (vph)	648	350	573	345	1155	334	1022	677
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	0.84	0.85	0.99	1.11	0.69	0.44	0.51	0.59

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↱			✥		↰	↑↱		↰	↑↑	↱
Traffic Volume (vph)	503	153	120	11	67	444	352	708	23	135	477	366
Future Volume (vph)	503	153	120	11	67	444	352	708	23	135	477	366
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.97			1.00		1.00	1.00		1.00	1.00	0.86
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.93			0.89		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1686			1647		1770	3520		1770	3539	1363
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1686			1647		1770	3520		1770	3539	1363
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)	547	166	130	12	73	483	383	770	25	147	518	398
RTOR Reduction (vph)	0	32	0	0	220	0	0	3	0	0	0	293
Lane Group Flow (vph)	547	264	0	0	348	0	383	792	0	147	518	105
Confl. Peds. (#/hr)			47						1			40
Confl. Bikes (#/hr)			4						4			7
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	16.4	16.4			19.3		17.6	29.5		11.8	23.7	23.7
Effective Green, g (s)	16.4	16.4			19.3		17.6	29.5		11.8	23.7	23.7
Actuated g/C Ratio	0.18	0.18			0.21		0.20	0.33		0.13	0.26	0.26
Clearance Time (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0			2.0		2.0	3.0		2.0	3.0	3.0
Lane Grp Cap (vph)	625	307			353		346	1153		232	931	358
v/s Ratio Prot	c0.16	0.16			c0.21		c0.22	c0.23		0.08	0.15	
v/s Ratio Perm												0.08
v/c Ratio	0.88	0.86			0.99		1.11	0.69		0.63	0.56	0.29
Uniform Delay, d1	35.8	35.7			35.2		36.2	26.2		37.1	28.6	26.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.6	20.4			43.6		80.4	3.3		4.1	2.4	2.1
Delay (s)	48.4	56.1			78.9		116.6	29.6		41.2	31.0	28.5
Level of Service	D	E			E		F	C		D	C	C
Approach Delay (s)		51.1			78.9			57.9			31.5	
Approach LOS		D			E			E			C	

Intersection Summary			
HCM 2000 Control Delay	51.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	96.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	43	134	135	291	5	899	59	908
v/c Ratio	0.86	0.42	0.79	0.92	0.01	0.64	0.17	0.64
Control Delay	150.3	57.7	90.3	89.0	6.5	14.2	6.4	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	150.3	57.7	90.3	89.0	6.5	14.2	6.4	10.9
Queue Length 50th (ft)	41	114	127	262	1	310	14	377
Queue Length 95th (ft)	#90	147	#188	#333	m3	363	31	497
Internal Link Dist (ft)		468		521		1923		337
Turn Bay Length (ft)	55		90		75		90	
Base Capacity (vph)	52	336	177	330	337	1398	343	1420
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	0.83	0.40	0.76	0.88	0.01	0.64	0.17	0.64

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.

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	32	91	8	107	135	95	4	692	72	56	858	5
Future Volume (vph)	32	91	8	107	135	95	4	692	72	56	858	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.97	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.94		1.00	0.99		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)	1765	1830		1721	1715		1770	1828		1770	1861	
Flt Permitted	0.16	1.00		0.53	1.00		0.24	1.00		0.24	1.00	
Satd. Flow (perm)	290	1830		969	1715		443	1828		451	1861	
Peak-hour factor, PHF	0.74	0.74	0.74	0.79	0.79	0.79	0.85	0.85	0.85	0.95	0.95	0.95
Adj. Flow (vph)	43	123	11	135	171	120	5	814	85	59	903	5
RTOR Reduction (vph)	0	2	0	0	17	0	0	2	0	0	0	0
Lane Group Flow (vph)	43	132	0	135	274	0	5	897	0	59	908	0
Confl. Peds. (#/hr)	2		11	11		2	7		8	8		7
Confl. Bikes (#/hr)			5			9			10			20
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)	26.3	26.3		26.3	26.3		114.5	114.5		114.5	114.5	
Effective Green, g (s)	26.3	26.3		26.3	26.3		114.5	114.5		114.5	114.5	
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.76	0.76		0.76	0.76	
Clearance Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	50	320		169	300		338	1395		344	1420	
v/s Ratio Prot		0.07			c0.16			c0.49			0.49	
v/s Ratio Perm	0.15			0.14			0.01			0.13		
v/c Ratio	0.86	0.41		0.80	0.91		0.01	0.64		0.17	0.64	
Uniform Delay, d1	60.1	55.0		59.3	60.7		4.2	8.2		4.8	8.2	
Progression Factor	1.00	1.00		1.00	1.00		1.37	1.45		1.00	1.00	
Incremental Delay, d2	76.1	0.9		22.5	30.2		0.1	1.6		1.1	2.2	
Delay (s)	136.2	55.8		81.9	91.0		5.9	13.6		5.9	10.4	
Level of Service	F	E		F	F		A	B		A	B	
Approach Delay (s)		75.3			88.1			13.5			10.1	
Approach LOS		E			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	29.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

2: Willow Rd & Middlefield Rd

Timing Plan: A.M. Peak

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	226	465	94	478	180	50	313	162	249	256	499
v/c Ratio	0.80	0.79	0.32	0.85	0.61	0.16	0.94	0.49	0.43	0.43	0.74
Control Delay	80.0	69.3	45.8	61.3	30.1	53.3	96.9	30.1	37.5	37.5	24.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	80.0	69.3	45.8	61.3	30.1	53.3	96.9	30.1	37.5	37.5	24.3
Queue Length 50th (ft)	232	237	63	241	70	42	305	63	215	222	258
Queue Length 95th (ft)	#346	304	m101	280	135	69	#360	101	m307	m315	408
Internal Link Dist (ft)		465		339			466			185	
Turn Bay Length (ft)	270		120		65	75		110	150		65
Base Capacity (vph)	308	639	305	581	303	322	339	338	580	594	674
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.73	0.31	0.82	0.59	0.16	0.92	0.48	0.43	0.43	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑↱		↰	↑↱	↱	↰	↑	↱	↰	↰↑	↱
Traffic Volume (vph)	283	322	17	81	394	172	38	238	123	367	102	464
Future Volume (vph)	283	322	17	81	394	172	38	238	123	367	102	464
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3	5.3	4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	0.91	0.91		1.00	0.91	0.91	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	1.00	0.92	1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.99	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1610	3333		1770	3360	1354	1770	1863	1458	1681	1721	1484
Flt Permitted	0.95	0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1610	3333		1770	3360	1354	1770	1863	1458	1681	1721	1484
Peak-hour factor, PHF	0.90	0.90	0.90	0.86	0.86	0.86	0.76	0.76	0.76	0.93	0.93	0.93
Adj. Flow (vph)	314	358	19	94	458	200	50	313	162	395	110	499
RTOR Reduction (vph)	0	2	0	0	2	71	0	0	73	0	0	162
Lane Group Flow (vph)	226	463	0	94	476	109	50	313	89	249	256	337
Confl. Peds. (#/hr)			1			22			31			23
Confl. Bikes (#/hr)			6			9			16			28
Turn Type	Split	NA		Split	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	2	2		3	3		1	1		4	4	
Permitted Phases						3			1			4
Actuated Green, G (s)	26.3	26.3		25.1	25.1	25.1	26.8	26.8	26.8	51.8	51.8	51.8
Effective Green, g (s)	26.3	26.3		25.1	25.1	25.1	26.8	26.8	26.8	51.8	51.8	51.8
Actuated g/C Ratio	0.18	0.18		0.17	0.17	0.17	0.18	0.18	0.18	0.35	0.35	0.35
Clearance Time (s)	5.3	5.3		5.3	5.3	5.3	4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	282	584		296	562	226	316	332	260	580	594	512
v/s Ratio Prot	c0.14	0.14		0.05	c0.14		0.03	c0.17		0.15	0.15	
v/s Ratio Perm						0.08			0.06			c0.23
v/c Ratio	0.80	0.79		0.32	0.85	0.48	0.16	0.94	0.34	0.43	0.43	0.66
Uniform Delay, d1	59.3	59.2		54.9	60.6	56.6	52.1	60.8	53.9	37.7	37.8	41.6
Progression Factor	1.00	1.00		0.79	0.80	0.75	1.00	1.00	1.00	0.91	0.91	0.85
Incremental Delay, d2	15.0	7.3		0.5	9.7	1.4	0.2	34.5	0.8	1.7	1.7	4.9
Delay (s)	74.3	66.6		43.8	58.4	43.5	52.3	95.3	54.7	36.0	36.0	40.2
Level of Service	E	E		D	E	D	D	F	D	D	D	D
Approach Delay (s)		69.1			53.0			78.7			38.1	
Approach LOS		E			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	56.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

3: Palo Alto Ave/Woodland Ave & Middlefield Rd

Timing Plan: A.M. Peak

	↗	→	←	↘	↙
Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	87	743	586	224	148
v/c Ratio	0.52	0.36	0.70	0.53	0.26
Control Delay	48.1	4.4	23.2	27.5	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	48.1	4.4	23.2	27.5	5.1
Queue Length 50th (ft)	39	40	221	86	0
Queue Length 95th (ft)	m62	59	347	154	38
Internal Link Dist (ft)		318	197		
Turn Bay Length (ft)	50			30	
Base Capacity (vph)	177	2052	836	420	570
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	0.49	0.36	0.70	0.53	0.26

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

3: Palo Alto Ave/Woodland Ave & Middlefield Rd

Timing Plan: A.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑			↱			✥		↰		↱
Traffic Volume (vph)	84	721	0	0	501	38	0	0	0	222	0	147
Future Volume (vph)	84	721	0	0	501	38	0	0	0	222	0	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5					4.5		4.5
Lane Util. Factor	1.00	0.95			1.00					1.00		1.00
Frpb, ped/bikes	1.00	1.00			1.00					1.00		0.98
Flpb, ped/bikes	1.00	1.00			1.00					0.99		1.00
Frt	1.00	1.00			0.99					1.00		0.85
Flt Protected	0.95	1.00			1.00					0.95		1.00
Satd. Flow (prot)	1770	3539			1841					1756		1555
Flt Permitted	0.95	1.00			1.00					0.76		1.00
Satd. Flow (perm)	1770	3539			1841					1400		1555
Peak-hour factor, PHF	0.97	0.97	0.97	0.92	0.92	0.92	0.25	0.25	0.25	0.99	0.99	0.99
Adj. Flow (vph)	87	743	0	0	545	41	0	0	0	224	0	148
RTOR Reduction (vph)	0	0	0	0	3	0	0	0	0	0	0	104
Lane Group Flow (vph)	87	743	0	0	583	0	0	0	0	224	0	44
Confl. Peds. (#/hr)	5		6	6		5			6	6		
Confl. Bikes (#/hr)			5			2			1			8
Turn Type	Prot	NA			NA					Perm		Perm
Protected Phases	7	4			8			2				
Permitted Phases							2			6		6
Actuated Green, G (s)	6.0	43.5			33.0					22.5		22.5
Effective Green, g (s)	6.0	43.5			33.0					22.5		22.5
Actuated g/C Ratio	0.08	0.58			0.44					0.30		0.30
Clearance Time (s)	4.5	4.5			4.5					4.5		4.5
Vehicle Extension (s)	3.0	3.0			3.0					3.0		3.0
Lane Grp Cap (vph)	141	2052			810					420		466
v/s Ratio Prot	c0.05	0.21			c0.32							
v/s Ratio Perm										c0.16		0.03
v/c Ratio	0.62	0.36			0.72					0.53		0.10
Uniform Delay, d1	33.4	8.4			17.2					21.9		18.9
Progression Factor	1.20	0.48			1.00					1.00		1.00
Incremental Delay, d2	6.6	0.4			5.5					4.8		0.4
Delay (s)	46.6	4.4			22.7					26.7		19.3
Level of Service	D	A			C					C		B
Approach Delay (s)		8.8			22.7			0.0			23.7	
Approach LOS		A			C			A			C	

Intersection Summary			
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↱		⇅	
Traffic Volume (veh/h)	24	925	507	5	2	32
Future Volume (Veh/h)	24	925	507	5	2	32
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.95	0.95	0.92	0.92
Hourly flow rate (vph)	26	984	534	5	2	35
Pedestrians		2	4		10	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		3.5	3.5		3.5	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)		494				
pX, platoon unblocked					0.71	
vC, conflicting volume	549				1586	548
vC1, stage 1 conf vol					546	
vC2, stage 2 conf vol					1040	
vCu, unblocked vol	549				1622	548
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	97				99	93
cM capacity (veh/h)	1011				258	530

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	26	984	539	37
Volume Left	26	0	0	2
Volume Right	0	0	5	35
cSH	1011	1700	1700	501
Volume to Capacity	0.03	0.58	0.32	0.07
Queue Length 95th (ft)	2	0	0	6
Control Delay (s)	8.7	0.0	0.0	12.8
Lane LOS	A			B
Approach Delay (s)	0.2		0.0	12.8
Approach LOS				B

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		

5: Pope St & Central Ave

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Volume (veh/h)	2	78	37	17	82	2
Future Volume (Veh/h)	2	78	37	17	82	2
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.72	0.72	0.84	0.84
Hourly flow rate (vph)	2	85	51	24	98	2
Pedestrians					8	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	83				160	71
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	83				160	71
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				88	100
cM capacity (veh/h)	1503				824	984

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	87	75	100
Volume Left	2	0	98
Volume Right	0	24	2
cSH	1503	1700	826
Volume to Capacity	0.00	0.04	0.12
Queue Length 95th (ft)	0	0	10
Control Delay (s)	0.2	0.0	10.0
Lane LOS	A		A
Approach Delay (s)	0.2	0.0	10.0
Approach LOS			A

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	17.0%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 6: Woodland Ave & Pope St/Chaucer St

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	77	50	77
Average Queue (ft)	38	25	43
95th Queue (ft)	62	42	67
Link Distance (ft)	283	395	346
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

HCM Unsignalized Intersection Capacity Analysis
6: Woodland Ave & Pope St/Chaucer St

Mitigation Measures - Option 2
Timing Plan: A.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	25	0	134	0	0	0	20	58	0	0	138	32
Future Volume (vph)	25	0	134	0	0	0	20	58	0	0	138	32
Peak Hour Factor	0.88	0.88	0.88	0.82	0.82	0.82	0.79	0.79	0.79	0.94	0.94	0.94
Hourly flow rate (vph)	28	0	152	0	0	0	25	73	0	0	147	34

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	180	0	98	181
Volume Left (vph)	28	0	25	0
Volume Right (vph)	152	0	0	34
Hadj (s)	-0.44	0.00	0.09	-0.08
Departure Headway (s)	4.1	4.7	4.6	4.3
Degree Utilization, x	0.20	0.00	0.12	0.22
Capacity (veh/h)	821	705	744	788
Control Delay (s)	8.1	7.7	8.2	8.5
Approach Delay (s)	8.1	0.0	8.2	8.5
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.3		
Level of Service	A		
Intersection Capacity Utilization	34.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
7: Palo Alto Ave & Chaucer St

Mitigation Measures - Option 2
Timing Plan: A.M. Peak

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (veh/h)	0	0	0	3	0	1	0	2	6	2	2	0
Future Volume (Veh/h)	0	0	0	3	0	1	0	2	6	2	2	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.85	0.85	0.85	0.92	0.92	0.92	0.25	0.25	0.25
Hourly flow rate (vph)	0	0	0	4	0	1	0	2	7	8	8	0
Pedestrians		2			3			2			8	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		0			0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					517							
pX, platoon unblocked												
vC, conflicting volume	9			2			16	19	5	28	18	10
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	9			2			16	19	5	28	18	10
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	99	99	100
cM capacity (veh/h)	1599			1617			979	864	1073	955	865	1060

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	5	9	16
Volume Left	0	4	0	8
Volume Right	0	1	7	0
cSH	1700	1617	1018	908
Volume to Capacity	0.00	0.00	0.01	0.02
Queue Length 95th (ft)	0	0	1	1
Control Delay (s)	0.0	5.8	8.6	9.0
Lane LOS		A	A	A
Approach Delay (s)	0.0	5.8	8.6	9.0
Approach LOS			A	A

Intersection Summary			
Average Delay	8.4		
Intersection Capacity Utilization	16.6%	ICU Level of Service	A
Analysis Period (min)	15		

Queues

8: University Ave & Chaucer St

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	8	71	394	766
v/c Ratio	0.03	0.23	0.26	0.50
Control Delay	20.6	13.0	2.8	4.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.6	13.0	2.8	4.5
Queue Length 50th (ft)	1	3	31	81
Queue Length 95th (ft)	14	24	70	174
Internal Link Dist (ft)	437	466	382	498
Turn Bay Length (ft)				
Base Capacity (vph)	987	986	1787	1781
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.01	0.07	0.22	0.43

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	2	2	4	7	2	40	1	361	1	7	674	1
Future Volume (vph)	2	2	4	7	2	40	1	361	1	7	674	1
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			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.94			0.94			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.93			0.89			1.00			1.00	
Flt Protected		0.99			0.99			1.00			1.00	
Satd. Flow (prot)		1619			1546			1862			1861	
Flt Permitted		0.92			0.95			1.00			1.00	
Satd. Flow (perm)		1500			1476			1860			1855	
Peak-hour factor, PHF	0.90	0.90	0.90	0.69	0.69	0.69	0.92	0.92	0.92	0.89	0.89	0.89
Adj. Flow (vph)	2	2	4	10	3	58	1	392	1	8	757	1
RTOR Reduction (vph)	0	4	0	0	54	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	4	0	0	17	0	0	394	0	0	766	0
Confl. Peds. (#/hr)	6		4	4		6	5		3	3		5
Confl. Bikes (#/hr)			18			10			7			23
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)		3.5			3.5			33.3			33.3	
Effective Green, g (s)		3.5			3.5			33.3			33.3	
Actuated g/C Ratio		0.08			0.08			0.73			0.73	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			4.0			4.0	
Lane Grp Cap (vph)		114			112			1352			1348	
v/s Ratio Prot												
v/s Ratio Perm		0.00			c0.01			0.21			c0.41	
v/c Ratio		0.04			0.16			0.29			0.57	
Uniform Delay, d1		19.6			19.8			2.2			2.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.7			0.2			0.7	
Delay (s)		19.7			20.4			2.3			3.6	
Level of Service		B			C			A			A	
Approach Delay (s)		19.7			20.4			2.3			3.6	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	4.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	45.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

9: University Ave & Woodland Ave/Scofield Ave

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	424	219	490	108	653	253	1022	570
v/c Ratio	0.88	0.78	1.07	0.57	0.62	0.75	0.72	0.62
Control Delay	57.4	45.9	89.9	47.1	29.3	45.6	25.6	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	45.9	89.9	47.1	29.3	45.6	25.6	5.3
Queue Length 50th (ft)	115	84	~253	56	153	128	239	0
Queue Length 95th (ft)	#195	#194	#442	103	231	192	329	71
Internal Link Dist (ft)		498	512		536		443	
Turn Bay Length (ft)				160		210		
Base Capacity (vph)	484	284	457	249	1051	458	1420	915
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	0.88	0.77	1.07	0.43	0.62	0.55	0.72	0.62

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.

9: University Ave & Woodland Ave/Scofield Ave

Timing Plan: A.M. Peak

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↱			✥		↰	↑↱		↰	↑↑	↱
Traffic Volume (vph)	390	93	109	15	121	315	99	588	13	233	940	524
Future Volume (vph)	390	93	109	15	121	315	99	588	13	233	940	524
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.97			0.99		1.00	1.00		1.00	1.00	0.90
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.92			0.91		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1659			1668		1770	3526		1770	3539	1431
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1659			1668		1770	3526		1770	3539	1431
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)	424	101	118	16	132	342	108	639	14	253	1022	570
RTOR Reduction (vph)	0	50	0	0	95	0	0	1	0	0	0	345
Lane Group Flow (vph)	424	169	0	0	395	0	108	652	0	253	1022	225
Confl. Peds. (#/hr)			39						3			26
Confl. Bikes (#/hr)			2			2						10
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	11.9	11.9			18.5		8.1	25.3		16.3	33.5	33.5
Effective Green, g (s)	11.9	11.9			18.5		8.1	25.3		16.3	33.5	33.5
Actuated g/C Ratio	0.14	0.14			0.22		0.10	0.30		0.19	0.39	0.39
Clearance Time (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0			2.0		2.0	3.0		2.0	3.0	3.0
Lane Grp Cap (vph)	480	232			363		168	1049		339	1394	563
v/s Ratio Prot	c0.12	0.10			c0.24		0.06	0.18		c0.14	c0.29	
v/s Ratio Perm												0.16
v/c Ratio	0.88	0.73			1.09		0.64	0.62		0.75	0.73	0.40
Uniform Delay, d1	35.9	35.0			33.2		37.1	25.7		32.4	21.9	18.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	16.9	9.3			72.5		6.2	2.8		7.6	3.4	2.1
Delay (s)	52.7	44.3			105.8		43.2	28.5		40.0	25.4	20.6
Level of Service	D	D			F		D	C		D	C	C
Approach Delay (s)		49.9			105.8			30.6			25.9	
Approach LOS		D			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	41.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues

1: Willow Rd & Gilbert Ave

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	18	96	88	127	5	262	121	757
v/c Ratio	0.14	0.41	0.59	0.53	0.01	0.19	0.14	0.51
Control Delay	45.6	46.2	63.8	50.1	4.0	3.4	4.0	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.6	46.2	63.8	50.1	4.0	3.4	4.0	6.5
Queue Length 50th (ft)	13	63	66	84	1	30	16	152
Queue Length 95th (ft)	29	93	113	137	3	44	32	207
Internal Link Dist (ft)		468		521		1923		337
Turn Bay Length (ft)	55		90		75		90	
Base Capacity (vph)	181	340	216	341	480	1406	858	1477
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	0.10	0.28	0.41	0.37	0.01	0.19	0.14	0.51

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	14	60	16	78	82	31	3	122	43	87	538	7
Future Volume (vph)	14	60	16	78	82	31	3	122	43	87	538	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.98		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.98	1.00		0.99	1.00		0.97	1.00	
Frt	1.00	0.97		1.00	0.96		1.00	0.96		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)	1747	1778		1733	1768		1760	1759		1717	1858	
Flt Permitted	0.53	1.00		0.64	1.00		0.33	1.00		0.60	1.00	
Satd. Flow (perm)	973	1778		1161	1768		603	1759		1080	1858	
Peak-hour factor, PHF	0.79	0.79	0.79	0.89	0.89	0.89	0.63	0.63	0.63	0.72	0.72	0.72
Adj. Flow (vph)	18	76	20	88	92	35	5	194	68	121	747	10
RTOR Reduction (vph)	0	9	0	0	12	0	0	8	0	0	0	0
Lane Group Flow (vph)	18	87	0	88	115	0	5	254	0	121	757	0
Confl. Peds. (#/hr)	6		9	9		6	8		17	17		8
Confl. Bikes (#/hr)			9						11			4
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)	15.4	15.4		15.4	15.4		95.4	95.4		95.4	95.4	
Effective Green, g (s)	15.4	15.4		15.4	15.4		95.4	95.4		95.4	95.4	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.80	0.80		0.80	0.80	
Clearance Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	124	228		148	226		479	1398		858	1477	
v/s Ratio Prot		0.05			0.06			0.14			c0.41	
v/s Ratio Perm	0.02			c0.08			0.01			0.11		
v/c Ratio	0.15	0.38		0.59	0.51		0.01	0.18		0.14	0.51	
Uniform Delay, d1	46.5	47.9		49.4	48.8		2.5	2.9		2.8	4.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	1.1		6.3	1.8		0.0	0.3		0.3	1.3	
Delay (s)	47.0	49.0		55.6	50.6		2.6	3.2		3.2	5.5	
Level of Service	D	D		E	D		A	A		A	A	
Approach Delay (s)		48.7			52.6			3.2			5.2	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues
2: Willow Rd & Middlefield Rd

	↗	→	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	127	584	133	710	99	48	123	319	244	244	354
v/c Ratio	0.36	0.79	0.28	0.78	0.23	0.19	0.45	0.66	0.68	0.67	0.81
Control Delay	54.8	62.8	46.2	56.4	16.8	59.5	63.9	13.0	63.4	62.7	46.9
Queue Delay	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.8	62.8	46.2	57.6	16.8	59.5	63.9	13.0	63.4	62.7	46.9
Queue Length 50th (ft)	123	313	109	374	20	42	113	0	247	246	216
Queue Length 95th (ft)	210	420	182	484	80	80	172	48	332	331	309
Internal Link Dist (ft)		465		339			466			185	
Turn Bay Length (ft)	270		120		65	75		110	150		65
Base Capacity (vph)	433	907	612	1170	531	408	429	580	516	525	570
Starvation Cap Reductn	0	0	0	247	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.64	0.22	0.77	0.19	0.12	0.29	0.55	0.47	0.46	0.62

Intersection Summary

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑↑↱		↰	↑↑↱	↱	↰	↑	↱	↰	↰↑	↱
Traffic Volume (vph)	130	511	14	128	671	106	39	100	258	353	57	297
Future Volume (vph)	130	511	14	128	671	106	39	100	258	353	57	297
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3	5.3	4.7	4.7	4.7	4.7	4.7	4.7
Lane Util. Factor	0.91	0.91		1.00	0.91	0.91	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.92	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1610	3369		1770	3381	1400	1770	1863	1458	1681	1708	1531
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1610	3369		1770	3381	1400	1770	1863	1458	1681	1708	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.81	0.81	0.81	0.84	0.84	0.84
Adj. Flow (vph)	141	555	15	133	699	110	48	123	319	420	68	354
RTOR Reduction (vph)	0	1	0	0	1	55	0	0	272	0	0	114
Lane Group Flow (vph)	127	583	0	133	709	44	48	123	47	244	244	240
Confl. Peds. (#/hr)			5			9			28			11
Confl. Bikes (#/hr)			6			3			19			6
Turn Type	Split	NA		Split	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	2	2		3	3		1	1		4	4	
Permitted Phases						3			1			4
Actuated Green, G (s)	30.4	30.4		37.2	37.2	37.2	20.3	20.3	20.3	29.6	29.6	29.6
Effective Green, g (s)	30.4	30.4		37.2	37.2	37.2	20.3	20.3	20.3	29.6	29.6	29.6
Actuated g/C Ratio	0.22	0.22		0.27	0.27	0.27	0.15	0.15	0.15	0.22	0.22	0.22
Clearance Time (s)	5.3	5.3		5.3	5.3	5.3	4.7	4.7	4.7	4.7	4.7	4.7
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	355	744		478	914	378	261	275	215	361	367	329
v/s Ratio Prot	0.08	c0.17		0.08	c0.21		0.03	c0.07		0.15	0.14	
v/s Ratio Perm						0.03			0.03			c0.16
v/c Ratio	0.36	0.78		0.28	0.78	0.12	0.18	0.45	0.22	0.68	0.66	0.73
Uniform Delay, d1	45.3	50.5		39.6	46.3	37.8	51.3	53.5	51.6	49.5	49.4	50.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	5.4		0.3	4.2	0.1	0.3	1.2	0.5	4.9	4.5	8.1
Delay (s)	45.9	55.9		39.9	50.5	37.9	51.7	54.6	52.1	54.5	53.9	58.3
Level of Service	D	E		D	D	D	D	D	D	D	D	E
Approach Delay (s)		54.1			47.7			52.7			55.9	
Approach LOS		D			D			D			E	

Intersection Summary				
HCM 2000 Control Delay	52.4	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.71			
Actuated Cycle Length (s)	137.5	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	71.1%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

3: Palo Alto Ave/Woodland Ave & Middlefield Rd

Timing Plan: P.M. Peak

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	236	1102	1017	185	126
v/c Ratio	0.91	0.42	1.03	0.79	0.34
Control Delay	80.7	5.6	58.8	62.7	9.3
Queue Delay	0.0	0.9	0.0	0.0	0.0
Total Delay	80.7	6.5	58.8	62.7	9.3
Queue Length 50th (ft)	151	126	~705	111	0
Queue Length 95th (ft)	#261	141	#953	146	25
Internal Link Dist (ft)		318	197		
Turn Bay Length (ft)	50			30	
Base Capacity (vph)	259	2617	992	267	400
Starvation Cap Reductn	0	1127	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.91	0.74	1.03	0.69	0.32

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.

3: Palo Alto Ave/Woodland Ave & Middlefield Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑			↱			✥		↰		↱
Traffic Volume (vph)	196	915	0	0	767	168	0	0	0	135	0	92
Future Volume (vph)	196	915	0	0	767	168	0	0	0	135	0	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5					4.5		4.5
Lane Util. Factor	1.00	0.95			1.00					1.00		1.00
Frpb, ped/bikes	1.00	1.00			0.99					1.00		0.99
Flpb, ped/bikes	1.00	1.00			1.00					0.99		1.00
Frt	1.00	1.00			0.98					1.00		0.85
Flt Protected	0.95	1.00			1.00					0.95		1.00
Satd. Flow (prot)	1770	3539			1800					1758		1562
Flt Permitted	0.95	1.00			1.00					0.76		1.00
Satd. Flow (perm)	1770	3539			1800					1401		1562
Peak-hour factor, PHF	0.83	0.83	0.83	0.92	0.92	0.92	0.25	0.25	0.25	0.73	0.73	0.73
Adj. Flow (vph)	236	1102	0	0	834	183	0	0	0	185	0	126
RTOR Reduction (vph)	0	0	0	0	8	0	0	0	0	0	0	105
Lane Group Flow (vph)	236	1102	0	0	1009	0	0	0	0	185	0	21
Confl. Peds. (#/hr)	12		2	2		12			4	4		
Confl. Bikes (#/hr)			2			2			3			1
Turn Type	Prot	NA			NA					Perm		Perm
Protected Phases	7	4			8			2				
Permitted Phases							2			6		6
Actuated Green, G (s)	14.3	72.4			53.6					16.5		16.5
Effective Green, g (s)	14.3	72.4			53.6					16.5		16.5
Actuated g/C Ratio	0.15	0.74			0.55					0.17		0.17
Clearance Time (s)	4.5	4.5			4.5					4.5		4.5
Vehicle Extension (s)	3.0	3.0			3.0					3.0		3.0
Lane Grp Cap (vph)	258	2617			985					236		263
v/s Ratio Prot	c0.13	0.31			c0.56							
v/s Ratio Perm										c0.13		0.01
v/c Ratio	0.91	0.42			1.02					0.78		0.08
Uniform Delay, d1	41.2	4.8			22.2					39.0		34.3
Progression Factor	1.00	1.00			1.00					1.00		1.00
Incremental Delay, d2	34.0	0.1			35.1					15.6		0.1
Delay (s)	75.2	4.9			57.3					54.5		34.4
Level of Service	E	A			E					D		C
Approach Delay (s)		17.3			57.3			0.0			46.4	
Approach LOS		B			E			A			D	

Intersection Summary			
HCM 2000 Control Delay	35.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	97.9	Sum of lost time (s)	13.5
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
4: Middlefield Rd & Palo Alto Ave

Mitigation Measures - Option 2
Timing Plan: P.M. Peak

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↱		↰↱	
Traffic Volume (veh/h)	51	970	925	2	1	37
Future Volume (Veh/h)	51	970	925	2	1	37
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.89	0.89	0.69	0.69
Hourly flow rate (vph)	54	1032	1039	2	1	54
Pedestrians			2		14	
Lane Width (ft)			12.0		12.0	
Walking Speed (ft/s)			3.5		3.5	
Percent Blockage			0		1	
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)		494				
pX, platoon unblocked					0.73	
vC, conflicting volume	1055				2196	1054
vC1, stage 1 conf vol					1054	
vC2, stage 2 conf vol					1142	
vCu, unblocked vol	1055				2458	1054
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	92				99	80
cM capacity (veh/h)	651				184	271

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	54	1032	1041	55
Volume Left	54	0	0	1
Volume Right	0	0	2	54
cSH	651	1700	1700	269
Volume to Capacity	0.08	0.61	0.61	0.20
Queue Length 95th (ft)	7	0	0	19
Control Delay (s)	11.0	0.0	0.0	21.8
Lane LOS	B			C
Approach Delay (s)	0.5		0.0	21.8
Approach LOS				C

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

5: Pope St & Central Ave

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Volume (veh/h)	1	50	104	100	18	3
Future Volume (Veh/h)	1	50	104	100	18	3
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.76	0.76	0.86	0.86	0.53	0.53
Hourly flow rate (vph)	1	66	121	116	34	6
Pedestrians					7	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	244				254	186
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	244				254	186
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				95	99
cM capacity (veh/h)	1313				729	850

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	67	237	40
Volume Left	1	0	34
Volume Right	0	116	6
cSH	1313	1700	745
Volume to Capacity	0.00	0.14	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.1	0.0	10.1
Lane LOS	A		B
Approach Delay (s)	0.1	0.0	10.1
Approach LOS			B

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 6: Woodland Ave & Pope St/Chaucer St

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	55	92	85
Average Queue (ft)	30	46	44
95th Queue (ft)	49	74	70
Link Distance (ft)	288	400	344
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

HCM Unsignalized Intersection Capacity Analysis
6: Woodland Ave & Pope St/Chaucer St

Mitigation Measures - Option 2
Timing Plan: P.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	0	60	0	0	0	105	130	0	0	77	98
Future Volume (vph)	8	0	60	0	0	0	105	130	0	0	77	98
Peak Hour Factor	0.73	0.73	0.73	0.91	0.91	0.91	0.78	0.78	0.78	0.82	0.82	0.82
Hourly flow rate (vph)	11	0	82	0	0	0	135	167	0	0	94	120

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	93	0	302	214
Volume Left (vph)	11	0	135	0
Volume Right (vph)	82	0	0	120
Hadj (s)	-0.47	0.00	0.12	-0.30
Departure Headway (s)	4.6	5.2	4.5	4.2
Degree Utilization, x	0.12	0.00	0.37	0.25
Capacity (veh/h)	708	622	783	830
Control Delay (s)	8.2	8.2	10.1	8.5
Approach Delay (s)	8.2	0.0	10.1	8.5
Approach LOS	A	A	B	A

Intersection Summary			
Delay	9.3		
Level of Service	A		
Intersection Capacity Utilization	42.2%	ICU Level of Service	A
Analysis Period (min)	15		

7: Palo Alto Ave & Chaucer St

Timing Plan: P.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	0	0	0	3	0	10	0	8	15	4	2	0
Future Volume (Veh/h)	0	0	0	3	0	10	0	8	15	4	2	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.83	0.83	0.83	0.83	0.83	0.83	0.50	0.50	0.50
Hourly flow rate (vph)	0	0	0	4	0	12	0	10	18	8	4	0
Pedestrians		3			12			16			20	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		0			1			2			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					517							
pX, platoon unblocked												
vC, conflicting volume	32			16			35	56	28	69	50	29
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	32			16			35	56	28	69	50	29
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	99	98	99	100	100
cM capacity (veh/h)	1550			1577			924	805	1019	847	811	1023

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	16	28	12
Volume Left	0	4	0	8
Volume Right	0	12	18	0
cSH	1700	1577	931	835
Volume to Capacity	0.00	0.00	0.03	0.01
Queue Length 95th (ft)	0	0	2	1
Control Delay (s)	0.0	1.8	9.0	9.4
Lane LOS		A	A	A
Approach Delay (s)	0.0	1.8	9.0	9.4
Approach LOS			A	A

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	21.5%	ICU Level of Service	A
Analysis Period (min)	15		

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	20	48	266	575
v/c Ratio	0.05	0.12	0.19	0.44
Control Delay	14.9	13.7	4.9	6.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	14.9	13.7	4.9	6.8
Queue Length 50th (ft)	2	5	20	56
Queue Length 95th (ft)	20	31	80	237
Internal Link Dist (ft)	437	466	382	498
Turn Bay Length (ft)				
Base Capacity (vph)	1198	1076	1761	1644
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.02	0.04	0.15	0.35

Intersection Summary

8: University Ave & Chaucer St

Timing Plan: P.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	3	10	5	16	9	14	1	202	5	64	433	3
Future Volume (vph)	3	10	5	16	9	14	1	202	5	64	433	3
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			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.99			0.98			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.96			0.95			1.00			1.00	
Flt Protected		0.99			0.98			1.00			0.99	
Satd. Flow (prot)		1749			1702			1855			1849	
Flt Permitted		0.94			0.86			1.00			0.93	
Satd. Flow (perm)		1663			1487			1853			1732	
Peak-hour factor, PHF	0.90	0.90	0.90	0.81	0.81	0.81	0.78	0.78	0.78	0.87	0.87	0.87
Adj. Flow (vph)	3	11	6	20	11	17	1	259	6	74	498	3
RTOR Reduction (vph)	0	5	0	0	15	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	15	0	0	33	0	0	265	0	0	575	0
Confl. Peds. (#/hr)	3		4	4		3	8		3	3		8
Confl. Bikes (#/hr)			8			11			12			6
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)		5.0			5.0			24.8			24.8	
Effective Green, g (s)		5.0			5.0			24.8			24.8	
Actuated g/C Ratio		0.13			0.13			0.64			0.64	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			4.0			4.0	
Lane Grp Cap (vph)		214			191			1184			1107	
v/s Ratio Prot												
v/s Ratio Perm		0.01			c0.02			0.14			c0.33	
v/c Ratio		0.07			0.17			0.22			0.52	
Uniform Delay, d1		14.9			15.1			2.9			3.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.4			0.1			0.5	
Delay (s)		15.0			15.5			3.1			4.3	
Level of Service		B			B			A			A	
Approach Delay (s)		15.0			15.5			3.1			4.3	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	4.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	38.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues
9: University Ave & Woodland Ave/Scofield Ave

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	547	296	568	383	795	147	518	398
v/c Ratio	0.87	0.87	0.99	1.11	0.69	0.64	0.56	0.61
Control Delay	51.9	57.4	56.4	117.9	30.2	48.9	30.7	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.9	57.4	56.4	117.9	30.2	48.9	30.7	7.3
Queue Length 50th (ft)	156	143	~216	~258	197	80	128	0
Queue Length 95th (ft)	#238	#285	#419	#431	284	134	178	71
Internal Link Dist (ft)		498	512		536		443	
Turn Bay Length (ft)				160		210		
Base Capacity (vph)	648	350	573	345	1155	334	1022	677
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	0.84	0.85	0.99	1.11	0.69	0.44	0.51	0.59

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.

9: University Ave & Woodland Ave/Scofield Ave

Timing Plan: P.M. Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↱			✥		↰	↑↱		↰	↑↑	↱
Traffic Volume (vph)	503	153	120	11	67	444	352	708	23	135	477	366
Future Volume (vph)	503	153	120	11	67	444	352	708	23	135	477	366
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.97			1.00		1.00	1.00		1.00	1.00	0.86
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.93			0.89		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1686			1647		1770	3520		1770	3539	1363
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1686			1647		1770	3520		1770	3539	1363
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)	547	166	130	12	73	483	383	770	25	147	518	398
RTOR Reduction (vph)	0	32	0	0	220	0	0	3	0	0	0	293
Lane Group Flow (vph)	547	264	0	0	348	0	383	792	0	147	518	105
Confl. Peds. (#/hr)			47						1			40
Confl. Bikes (#/hr)			4						4			7
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	16.4	16.4			19.3		17.6	29.5		11.8	23.7	23.7
Effective Green, g (s)	16.4	16.4			19.3		17.6	29.5		11.8	23.7	23.7
Actuated g/C Ratio	0.18	0.18			0.21		0.20	0.33		0.13	0.26	0.26
Clearance Time (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0			2.0		2.0	3.0		2.0	3.0	3.0
Lane Grp Cap (vph)	625	307			353		346	1153		232	931	358
v/s Ratio Prot	c0.16	0.16			c0.21		c0.22	c0.23		0.08	0.15	
v/s Ratio Perm												0.08
v/c Ratio	0.88	0.86			0.99		1.11	0.69		0.63	0.56	0.29
Uniform Delay, d1	35.8	35.7			35.2		36.2	26.2		37.1	28.6	26.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.6	20.4			43.6		80.4	3.3		4.1	2.4	2.1
Delay (s)	48.4	56.1			78.9		116.6	29.6		41.2	31.0	28.5
Level of Service	D	E			E		F	C		D	C	C
Approach Delay (s)		51.1			78.9			57.9			31.5	
Approach LOS		D			E			E			C	

Intersection Summary			
HCM 2000 Control Delay	51.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	96.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Appendix F

Response to Comments

Table F-1. Key to Comments Received on the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project Upstream of Highway 101 Draft EIR

Letter	Commenter
A1	National Marine Fisheries Service (NMFS)
A2	City of East Palo Alto
A3	California Department of Fish and Wildlife (CDFW)
A4	San Francisco Bay Regional Water Quality Control Board (SFBRWQCB)
A5	City of Palo Alto
I1	Darshana Greenfield
I2	Ann Critchon
I3	Pat Samuel
I4	Paul Martin
I5	Nancy Yamada
I6	Joe MccWesley
I7	Chandra Permaul Nicola
I8	Kay Harrison
I9	Jeff Prudhomme
I10	Susan Glendening
I11	Dorian West
I12	Lennard Hachmann
I13	Steven Van Jepmond
I14	Stephen Kerman
I15	Xenia Hammer
I16	Jim Fehrle
I17	Sandy Lee
I18	William Ellsworth
I19	Meihong Wang
I20	Bruce McCaul
I21	Naomi Goodman
I22	Larry and April Alton
I23	Steve Eittreim
I24	Stephen Schooley
I25	Hamilton Hitchings
I26	Linea Stewart
I27	Dhruv Khanna
I28	Jim Fehrle
I29	Jim Fehrle
I30	Steve Bisset
I31	Jerry Hearn
I32	Tiffany Souza
I33	Larry Rockwell
I34	Jeffrey Shore
I35	Peter Joshua
I36	Carolyn Westgaard
I37	Susan Mittman
I38	Jay and Sallie Whaley

Letter	Commenter
I39	Jim Wiley
I40	Libby Lucas
I41	Ben Ball
I42	Jeff Prudhomme
I43	Kay Harrison
I44	Tate and Curtis Snyder
I45	Robert Jones
I46	William P. Parkin
I47	William Reller
O1	The Crescent Park Neighborhood Association Steering Committee
O2	California Trout, Beyond Searsville Dam, and Friends of the River
O3	California Trout, Beyond Searsville Dam, and Friends of the River
O4	Stanford University
O5	Palo Alto Community Eruv
O6	Allied Arts Guild
O7	Allied Arts Guild
PH1	Public Hearing 1, Held in Menlo Park on May 23, 2019
PH2	Public Hearing 2, Held in East Palo Alto on May 29, 2019
PH3	Public Hearing 3, Held in Palo Alto on June 5, 2019

Comment letters from other governmental agencies

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

June 19, 2019

Letter A1

Kevin Murray
Senior Project Manager
San Francisquito Creek Joint Powers Authority
615-B Menlo Avenue
Menlo Park, California 94025

Re: NOAA's National Marine Fisheries Service's Comments on Draft Environmental Impact Report for the San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101, April 2019

Dear Mr. Murray,

A1-1 This letter transmits NOAA's National Marine Fisheries Service's (NMFS) comments regarding the San Francisquito Creek Joint Powers Authority's (SFCJPA) Draft Environmental Impact Report for the "San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101" (hereafter referred to as "Draft EIR"), dated April 2019. The Draft EIR evaluates the environmental impacts of projects that will improve water conveyance and/or detention and reduce flooding in a highly urbanized and constrained portion of San Francisquito Creek in San Mateo and Santa Clara counties, California. The SFCJPA aims to develop a project that will protect communities, enhance habitat, provide recreational opportunities, and minimize future operations and maintenance. Seventeen alternatives were screened for their ability to meet project objectives. Four alternatives (including the no action alterative) were considered in depth. The Preferred Alternative achieves project objectives by replacing the Pope-Chaucer Bridge with a bridge that accommodates increased flow, widening the channel downstream of the bridge, enhancing aquatic habitat, and adding two small creekside parks.

The Preferred Alternative is located in San Francisquito Creek, a perennial stream (in upstream reaches) within the 45 square mile San Francisquito watershed. The creek originates in the largely undeveloped eastern foothills of the Santa Cruz Mountains, running 13 linear miles from Searsville Dam downstream through portions of Woodside, Palo Alto, Menlo Park, and East Palo Alto before discharging to the South San Francisco Bay. The lowest 4.15 miles of San Francisquito Creek typically goes dry or supports only shallow water by late spring, with some isolated pools located in the channel. A population of Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*), listed as threatened under the Endangered Species Act (62 FR 43937), occur in the San Francisquito Creek watershed, and portions of streams within that watershed are designated as critical habitat for this species (70 FR 52488). This watershed has considerable ecological importance to steelhead populations in the San Francisco Estuary (Leidy 2005, NMFS 2016).

A1-2 Many of the physical and biological features of CCC steelhead designated critical habitat have been degraded in the highly urbanized portion of San Francisquito Creek, including reaches where actions by this project would occur. This portion of San Francisquito Creek functions primarily as a

A1-2 Con't migratory corridor for anadromous steelhead because the watershed's rearing and spawning habitat exists upstream of the Preferred Alternative's proposed actions. However, improving habitat complexity and creation of velocity refuge in the proposed project area are recommended for adults migrating upstream and seasonal rearing by juvenile steelhead emigrating downstream to San Francisco Bay. The following are NMFS' comments regarding the Draft EIR/EIS.

A1-3

Improving Habitat Enhancements for Salmonids at Channel Widening Sites. The Preferred Alternative could result in the permanent removal of sack concrete and soil to widen the channel in several sites along the creek as well as replace the Pope-Chaucer Bridge. Proposed actions are estimated to affect a total of 6,385 linear feet of stream (p. 3.3-70). With the exception of a small vegetated bank at Site 2a, and the stream bed restoration at the Pope-Chaucer Bridge, most actions associated with the Preferred Alternative include replacing sack concrete, wood, and concrete with rock slope protection, sheetpile, and soil nail walls. At Site 2c elevation will be added to existing sack concrete.

NMFS supports removing hardscape from the stream banks and appreciates the challenges associated with enhancing habitat in this portion of San Francisquito Creek with extensive urban development on both sides of the channel. However, replacing sack concrete with rock slope protection and some willow plantings will not substantially improve habitat for CCC steelhead. Additional habitat enhancement features that add complexity, increase coarse sediment, improve riparian vegetation, and provide velocity refuge would restore some of the physical and biological features of aquatic habitat for CCC steelhead that have been lost from this portion of San Francisquito Creek.

The Draft EIR contains considerable detail regarding the construction techniques and materials for bridge construction and bank hardening, but information regarding aquatic habitat restoration features is lacking. For example, page 3.3-83 of the Draft EIR refers to the construction of three pool/riffle features along the restored channel at Pope-Chaucer Bridge and six velocity refuge features along the widened reaches, but there is no detail regarding these structures or the rationale for the number of features proposed. Information for the type, size, acreage, and location of enhancement features should be described in more detail in the final EIR. The extent of potential benefits or impacts to CCC steelhead is challenging to assess without these design details. NMFS recommends placement of large woody debris, boulders, pools, and coarse bed material at channel widening sites and in areas where the streambed will be disturbed to achieve the project's ecosystem restoration objective. These enhancements would improve conditions for migrating steelhead adults and seasonal rearing by juveniles in lower San Francisquito Creek.

A1-4

Draft EIR Lacks Information Needed to Evaluate Potential Fish Passage Effects to Steelhead. A key concern for steelhead in lower San Francisquito Creek is to ensure there are no velocity barriers for adults migrating upstream during high flow events. Changes to the channel that increase flood conveyance will impact water velocities in the creek and could affect adult steelhead attempting to traverse upstream. If there are long stretches of channel with no velocity breaks, steelhead migration could be restricted under some streamflow conditions. The project analyzes the potential effects of increased high volume events related to flooding, but does not analyze the effects of changes to flow on fish migration. Understanding changes to water velocity in the proposed project area under the expected range of streamflow conditions, including common, moderate precipitation events during the steelhead migration season (December through April), will be necessary to fully assess the effects of the project on CCC steelhead. An analysis of flow changes

A1-4 Con't would also inform habitat enhancement design for where velocity breaks would be recommended for migrating juveniles and adults.

A1-5 **Adding Process Details for "Project-Level" Reviews.** Currently the Draft EIR does not present a process which allows agencies such as NMFS to provide comment on design elements. Although the Draft EIR may not have detailed designs for the Preferred Alternative, the EIR could describe a process for agency input and comment on project-level design plans. For example, once habitat enhancement features are developed in more detail, preliminary designs could be submitted to NMFS for review and comment.

A1-6 **Impact BIO-6 Effects on Steelhead and Suitable Habitat for Preferred Alternative.** The Draft EIR concludes that construction, operations, and maintenance of the Preferred Alternative would result in less than significant impacts on steelhead and their habitat. Considering the extent of bed disturbance where construction would occur, the extraction of large amounts of soil for channel widening, collection and relocation of steelhead, temporal loss of riparian habitat, and potential permanent impacts to fish migration associated with changes to channel velocities, the Draft EIR does not provide sufficient information to conclude there would be less than significant impacts to steelhead even with mitigation measures proposed.

A1-7 **Evaluating Alternatives Prior to Screening.** Limited information was provided for the thirteen alternatives not considered for further analysis. Providing more rationale for those projects removed from consideration for further analysis would be helpful.

A1-8 **Section 3.1.1. Regulatory Setting.** This section should include a brief description of the NMFS Coastal Multispecies Recovery Plan for CCC steelhead (NMFS 2016), and include consideration of the various recovery actions that are germane to the project area. Channel modification, fish passage is described as a very high threat to CCC steelhead in San Francisquito Creek. Increasing habitat complexity within degraded portions of the creek is part of the recovery strategy.

NMFS appreciates the opportunity to comment on the SFCJPA's Draft EIR for the San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101. Please contact Alison Weber-Stover of my staff at 707-575-6091 or alison.weber-stover@noaa.gov if you have questions regarding these comments.

Sincerely,

Gary Stern

Gary Stern
San Francisco Bay Branch Chief
North-Central Coast Office

cc: Gregory Brown, USACOE, gregory.g.brown@usace.army.mil
Joseph Terry, USFWS, joseph_terry@fws.gov
Mayra Molina, CDFW, mayra.molina@wildlife.ca.gov
Susan Glendening, RWQCB, susan.glendening@waterboards.ca.gov
Copy to ARN File #151422WCR2019SR00124

Literature Cited

Leidy, R. A., G. S. Becker, and B. N. Harvey. 2005a. Historical distribution and current status of steelhead/rainbow trout (*Oncorhynchus mykiss*) in streams of the San Francisco Estuary, California. Center for Ecosystem Management and Restoration, Oakland, California.

National Marine Fisheries Service. 2016. Coastal Multispecies Recovery Plan. National Marine. Fisheries Service, West Coast Region, Santa Rosa, California.

City of East Palo Alto
Office of the City Manager
2415 University Avenue
East Palo Alto, CA 94303

June 25, 2019

Letter A2

Len Materman, Executive Director
San Francisco Creek Joint Powers Authority
615 B Menlo Avenue
Menlo Park, CA 94025

RE: Draft EIR - San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101, City of East Palo Alto Review Comments

Dear Mr. Materman

Please find the City of East Palo Alto's review comments below for the Draft EIR - San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101:

Chapter 1 Introduction

- A2-1 The two Reach 2 alternatives analyzed in the most detail would increase creek flow at the location of least capacity, the Pope-Chaucer Bridge, by replacing the existing bridge with a new bridge of greater flow capacity, and would increase flow capacity between the new bridge and Reach 1. Thus, these project alternatives would enable the maximum flow that could enter Reach 2 from upstream to be contained within the channel throughout Reach 2. Because Reach 1 already has greater capacity, these high flows would safely reach San Francisco Bay. As the City of Palo Alto is working on the replacement of the Newell Bridge to accommodate the projected traffic flow (~70 years) under separate DEIR, being circulated now, it is critical that the replacement of the Bob Chaucer and Newell Bridges are coordinated to ensure the construction of the Newell Bridge is completed prior to Bob-Chaucer Bridge. It is also critical for the Bob-chaucer Bridge not to have more flow capacity than the existing University Avenue Bridge or the new Newell Bridge.

- A2-2 It appears that the design work being done by NV5 under the Santa Clara Valley Water District (District) is ahead of the Draft Environmental Impact Report (DEIR). Normally, completion of the EIR for a project would precede the preliminary design work, or at least be well ahead of design. This does not seem to be the case for the Upstream of Highway 101 project. It is okay for the design work to be happening now provided that the final product is consistent with what is studied in the EIR.?

- A2-3 The anticipated schedule to start construction in June, 2020, as being presented by the San Francisquito Creek Joint Powers Authority (JPA), is ambitious and does not seem to be realistic as funding and permitting will take some time and has not been secured.

Chapter 2 Program Description

- A2-4 This chapter should include discussion of the process to obtain private property easements and/or possible right-of-way acquisition if needed. Building retention basins at the Webb Ranch and/or Boething Nursery sites will require property acquisition or agreements with Stanford University. Are

A2-4 Con't these feasible alternatives? Also, proposed channel widening and possible floodwall construction will likely require easements and/or property acquisition.

- A2-5 Please include a statement that the construction methods and equipment lists included in *Section 2.8 Description of Alternatives* are considered typical for projects of this type. Provided the construction methods achieve the performance standards identified in the DEIR, there should be flexibility in construction methods as this is normally the purview of the contractor.

- A2-6 The total project schedule of 9 or 10 months for alternatives R2-A1 and R2-A2 mentioned in several places throughout the document seems aggressive. At the Jan 24, 2019 SF Creek JPA manager's meeting it was discussed that the Pope/Chaucer Bridge replacement work needs to be coordinated with Palo Alto's Newell Bridge replacement. This may require Reach 2 construction be done over two construction seasons with possibly the channel widening work done in the first season followed by the Pope/Chaucer Bridge the next season. Please provide schedule basis and breakdown of construction activities. It is recognized that in-channel activities are limited to the April 15 through October 15 timeframe.

- A2-7 Page 2-7, Section 2.5.11 Alternative 11: Remove the Pope-Chaucer Bridge and increase Capacity Downstream. This alternative would involve removing, not replacing, the Pope-Chaucer Bridge to increase flow capacity at the site. The bridge creates a constriction; if removed, at least 7,500 cfs of flow would be able to move past that location and downstream. To meet project objectives, this alternative would require additional flood protection downstream of the Pope-Chaucer Bridge, such as channel widening or floodwall construction. Did the EIR evaluate the impact of this alternative on the existing University Avenue Bridge.? In other word, will the flood risk be shifted downstream to University Avenue/Woodland Ave where flooding occurred in 2012? What is the current flow capacity of the University Ave Bridge? Shouldn't this flow capacity be the determining factor of the capacity of the new Pope-Chaucer Bridge design?

- A2-8 The sections for channel widening include discussion of various design features that will be considered including:
    - Soil nail walls
    - Reinforced concrete walls
    - Rock slope protection

  Will there be impact on existing utilities on University Avenue due to the proposed slope stabilization methods?

A2-9 Page 2-13: Figure 2-1: The highlighted staging area might not be feasible.

- A2-10 Page 2-22: Who would be responsible for the operation and maintenance of floodwalls?

- A2-11 Page 2-31: Concrete Truck Operation: A concrete truck would operate from Woodland Avenue, with a boom extended to (or across) the channel to access the areas where each wall would be built. Trees along Woodland Avenue and San Francisquito Creek would be pruned to accommodate the truck and boom. Has there been an assessment of the impact to the City trees that will be impacted? Any proposed mitigation?

A2-12

- Page 2-31: Traffic Management: At each access ramp, there would be temporary traffic stops with flaggers for loading/off-loading equipment and materials and vehicle ingress/egress to the site. In addition, traffic would move one way on Woodland Avenue when a concrete truck is operating from the road. Traffic would not be stopped for more than approximately 30 minutes at any site. 30 minutes is a long time for someone to stop. A complete traffic control plan/detours will be required for review/approval by the City of East Palo Alto before commencement of construction work.

A2-13

- Page 2-32: Construction of Small Creekside Parks: Consistent with the project objective of creating new recreational opportunities and connecting to existing bike and pedestrian corridors, two small creekside parks may be constructed in the City of East Palo Alto at the locations shown in Figures 2-3 and 2-4. The parks would be sited where construction access ramps were previously built and used. The parks would consist of landscaping and benches. The design would use gravel so as to maintain existing pervious surfaces. The total area of each creekside park would be a maximum of 400 square feet. The sizes of the creekside parks as proposed make no sense: 400 SF is the size of a two-car garage. The design of the creekside parks shall be coordinated with the Public Works Department and approved by the City of East Palo Alto.

A2-14

Chapter 3 Environmental Analysis

3.1 Aesthetics

- It would be helpful to have some photos and/or visual simulations included in the DEIR to help illustrate the aesthetics of the project and the alternatives.

A2-15

- A tree inventory should be provided – number, size, health, and species of the trees. Also, can the removal of trees be avoided? Size of trees to be installed, number and species should be noted.

- Common theme in this section – the loss of trees and vegetation needs to be further discussed in the visual impacts. Is there a diagram that shows the trees to be removed?

A2-16

- Pages 3.1-16 and 17: This discussion infers that the widened channel "would be consistent with the existing visual character…" If there is a mod-high sensitivity, how does a widened creek and removal of vegetation keep with the existing character? This comment applies to all channel widening sites.

- Page 3.1-21: Site 5 widening says the channel at this location will be 15 feet wider (on average). How does this compare to the current width?

A2-17

- Page 3.1-23: Construction, Floodwall Development: The presence of construction materials, equipment, onsite workers, and other associated improvements would alter the existing visual environment. Construction activities would introduce equipment and associated vehicles into the views of all viewer groups, especially residents. Construction activities would include earthwork, excavation and compaction, associated truck hauling and other major material and equipment movement and storage, vegetation pruning, and clearing, any of which could cause visual intrusions in any given area because these activities would be fairly visible to adjacent residential areas. Construction staging areas could also introduce visual changes to their immediate surroundings, with unsightly, visually chaotic aggregations of stored material and equipment. As mentioned, contractors would use best

A2-17 Con't management practices to further reduce or avoid visual impacts during construction. The Project shall include provisions for reconstruction of Woodland Avenue as to mitigate the anticipated impact of the project on Woodland Avenue and other City Streets that will be impacted by the Upstream of HWY 101Flood Control Project.

A2-18

- Though nighttime construction lighting may be somewhat visible to sensitive receptors, please define what nighttime hours may be allowed. Would any nighttime construction activity comply with the noise ordinance? Does the biological section discuss impacts of light on animals and/or habitat in the creek? Also, when would nighttime lighting be determined? Nighttime activities should be avoided given the proximity of residential uses and existing limited lighting in the area.

A2-19

- Is there a site plan that shows existing and proposed locations of all utility boxes, poles, etc. that are proposed to be relocated?

A2-20

- Which jurisdiction will be doing the tree removal permits and how will notification to nearby property owners/occupants occur?

A2-21

3.2 Air Quality

- Impact AQ-1 Conflict with or obstruct implementation of an applicable air quality plan cites specific mitigations to control emissions that will need to be included in project construction documents.
    - MM-AQ-1 requires clean diesel-powered equipment during construction
    - MM-AQ-1 requires on-road haul trucks have Model year 2010 or newer engines during construction
    - MM-AQ-3 requires a mitigation contract with BAAQMD
- Why is air quality evaluated qualitatively, rather than modeled quantitatively based on the identified construction equipment (e.g. Tier 4)?

- Endorse "MM-AQ-1 Utilize clean diesel-powered equipment during construction to control construction-related NOx emissions" for Alternatives R2-A1 and R2-A2. This aligns with the City of East Palo Alto's Climate Action Plan

- Endorse "MM-AQ-2: Use on-road haul trucks with model year 2010 and newer engines during construction" for Alternatives R2-A1 and R2-A2.

- Endorse that O& M activities can adhere to 'zero emission' equipment or lower GHG equipment

A2-22

3.3 Biological Resources

- Please discuss the impacts to biological resources due to the removal of the riparian habitat, trees and changes in the stream.

A2-23

- Has the SFJPA developed a strategy to reduce tree impacts?

- Page 3.3-54: Is there an exhibit that shows the locations of the trees slated for removal or major pruning on the East Palo Alto side of the creek?

- Please include compensation for construction impacts to adjacent trees not designated for removal through mitigation and remediation efforts.

- Please specify project arborist as part of the design team to reduce impacts. Meeting with the construction team prior to work is an important step but inadequate to protect trees in the development process.

- Please specify that the project arborist will submit tree protection plans prior to project approval for respective jurisdiction's review to ensure compliance with relative regulations.

A2-23 Con't

- Application and permits are required for any heritage tree removal requests.

- Is the Project Arborist a third party contractor?

3.6 Greenhouse Gas and Climate Change

- Page 3.6-5: 'the City of East Palo Alto have not adopted qualified GHG reduction strategies and cannot be solely relied on to make a significance determination for Impact GHG-1.'
    - East Palo Alto relies on the GHG emission information presented in this Climate Action Plan document. There are implementation strategies in place for to utilize carbon offset credits and recommended carbon neutral activities to enhance the carbon neutral community.

A2-24

- Page 3.6-12: "Use local building materials (at least 10%)."
    - Consider aligning this with the Climate Action Plan goals to use more than 10% local materials to reduce GHGs

- Endorse "Recycle at least 50% of construction waste or demolition materials."

A2-25

- Follow regulations set forth by the California Green Building Code effective on January 1, 2017, 65% of construction/demolition debris must be diverted.

3.7 Hazardous Materials and Public Health

- Page 3.7-17, Section 3.7.4, "Cumulative Impacts: the proposed project would incorporate mitigation consistent with all applicable federal, state, and local regulations related to the transport, use, or disposal hazardous materials and mosquito vector control. Therefore, the project is not expected to have significant effects related to creation of new areas of contamination or exposure of workers or the public to existing contamination. Therefore, would not make a cumulatively considerable contribution to the existing cumulative impact. No further analysis is required." Transporting, disposal or use of any hazardous materials shall require City of East Palo Alto special transportation permit.

A2-26

- Evacuation Routes: Woodland Avenue will be used as the main route to construct the project as proposed. Please include provisions to keep it open to emergency vehicles at all times as well as in the case of evacuation due to any emergencies.

A2-27

3.8 Hydrology and Water Resources

- The new Pope/Chaucer bridge can accommodate 7,500 cfs, while the University Ave. bridge can accommodate only 6,800 cfs. Please describe how this will not shift flooding risk downstream and lead to flooding at University Ave. In particular, provide a hydrologic and engineering analysis for how the channel and bridge approvach will accommodate the increased water flow.

A2-28

A2-28 Con't

- Are NV5 and ICF confident that there will be no significant downstream impacts due to the Pope/Chaucer Bridge replacement and/or channel widening or floodwall alternatives, especially upstream of the University Ave Bridge? What is the height of the flood walls on both sides of the creek between Euclid and University Ave?. Was there a recent hydrology study that was done to verify the creek flow capacity/demand? Please provide a copy of the study prior to design of the flood walls. Does the DEIR specifically analyze the impacts of the flood walls that will be required on both sides of the creek to accommodate the additional flow? Please confirm that the improvements (Creek widening, walls etc) near the University Ave bridge necessary to accommodate the additional water flow are adequate and included in the DEIR and all associated planning and financing project documents?

A2-29

<u>3.9 Land Use and Planning</u>

- Would the tree replacement plan comply with the City's Heritage Tree Ordinance?

A2-30

<u>3.10 Noise and Vibration</u>

- Page 3.10-13: Daytime hours are defined as 8 am to 6 pm Monday through Friday. Pile drivers hours as defined appear to exceed the noise ordinance.

- Page 3.10-14: The statement "Because Alternative R2-A2 construction activities would occur during daytime hours, noise from the construction equipment would not be subject to noise ordinance limits in East Palo Alto or Menlo Park" needs clarification and review of powered equipment. This is a general comment for all sections; is mitigation now required?

A2-31

- MM-NV-1: Can possible vibration attenuation methods be included as part of the mitigation now since residents along Woodland Avenue will be impacted instead of waiting for a complaint to occur since it appears that the activities will exceed acceptable levels? How frequently will monitoring occur?

- Is there a way to reduce the noise from back-up beeping sounds which can be annoying to nearby receptors? Replace the term "residences" with "property owners and occupants". Other sections and charts in the document indicate that advance written notifications will be sent to 1000 feet of the uses.

- Who will determine if construction hours would be extended? If this happens, property owners and occupants will need to be notified in advance.

- Temporary nose barriers – where would such barriers be located? Would this create any issues with trees, habitat, line-of-sight for vehicles? How would we know if the plywood barriers will reduce the sound to acceptable levels?

A2-32

<u>3.12 Recreation</u>

- Page 3.12-16: The project may include construction of two small creekside parks along Woodland Avenue in Reach 2. The parks may include landscaping and benches. The total area of each creekside park would be a maximum of 400 square feet. This project feature would add new parks and recreational facilities to the study area, which would be a beneficial effect. As stated above the proposed size of the small creekside parks is not adequate and they don't meet the City of East Palo Alto's definition of a small park. 400 square feet is the size of two-car garage. Please clarify the size of

A2-32 Con't the proposed creekside parks.

3.13 Traffic and Transportation

- Page 3.13-6, "With the addition of construction-generated traffic, the maximum increase in traffic for any particular project feature or alternative would be 60 trips per day (20 truck trips and 40 worker trips), using conservative estimates. Replacing the Pope-Chaucer Bridge would require the most workers at any one time (20), while channel widening at sites 1 through 4 would require the most haul trips per day (20) of all project components and alternatives. The number of workers and number of trips for the Reach 3 alternatives is unknown but anticipated to be less than the number required to replace the Pope-Chaucer Bridge. Traffic conditions on project access roads within the study area are within associated LOS standards during the peak hour. It is anticipated that an increase of eight trips per hour would not cause operation of these roadway segments to exceed LOS standards. However, there could be delays of up to 30 minutes at access ramps and there are alternate routes available. (Note that there would be no access ramp closures, just lane closures, with flaggers for guidance.) Therefore, the impact would be less than significant, and no mitigation is required."

A2-33

  - Up to 30 minutes traffic delays is not acceptable.
  - Special Transportation Permit is required for truck trips transporting materials on City of East Palo Alto streets.

- Segments of U.S. 101 in the study area operate at LOS F during peak hours, thereby exceeding the CMP LOS standard of LOS E. However, most of these segments have been assigned a CMP LOS standard of LOS F, because they have been operating at LOS F in 1991. Given the traffic LOS threshold defined by the CMP, for segments that operate at LOS F, the added vehicle trips from the project should not be more than 1 percent of freeway capacity (Santa Clara Valley Transportation Authority 2017).

- Page 3.13-8: "As discussed in Impact TT-1, the maximum number of daily trips generated by project construction would be approximately 60, which is less than 1 percent of the daily traffic volume on U.S. 101 in the study area (215,000 vehicles per day at the Santa Clara-San Mateo county line)." <u>Was there a traffic analysis conducted at the intersection of Woodland Ave/University Circle (Signalized Intersection)?</u>

A2-34

- Page 3.13-10: "Impact TT-4—Potential to obstruct emergency access: All project work areas, including the Pope-Chaucer Bridge, which would be closed temporarily during construction, would have the potential to affect emergency vehicle access. Construction-related traffic could also delay or obstruct the movement of emergency vehicles on local area roadways. However, the temporary traffic signal provided at Middlefield Road/Woodland Avenue-Palo Alto Avenue during closure of the Pope-Chaucer Bridge under MM-TT-1 and the site-specific traffic control plan required under MM-TT-2 would ensure unrestricted access and passage for emergency vehicles. With the implementation of MM-TT-1 and MM-TT-2, impacts on emergency access are expected to be less than significant."
  - Woodland Avenue is the main collector route to the Woodland Neighborhood. It will also be used as the main route to construct the project as proposed. Please include provisions to keep it open to emergency vehicles at all times as well as in the case of evacuation due to any emergencies.

3.14 Utilities and Service Systems

A2-35 There are existing utilities along Woodland Avenue, including water, sanitary sewer systems, electrical and communication lines that are within 10 ft of the creekbank. Working around the existing line is critical to avoid damage to existing utility lines. Widening the creek and selecting the proper slope stabilization method should be thoroughly analyzed during the design phase of the project.

Chapter 4 Other CEQA-Required Sections

4.1 Significant and Unavoidable Environmental Impacts

A2-36 The Air Quality discussion in Section 4.1 concludes there are temporary significant and unavoidable emissions during project construction. This seems to contradict the air quality chapter 3.2 where the impacts are all deemed less than significant with mitigation and the impacts are not cumulatively considerable.

A2-37 The City of East Palo Alto shares some of the same concerns/comments with the Cities of Menlo Park including visual impacts caused by the height of flood walls along Woodland Avenue.

Please feel free to contact Kamal Fallaha, the City of East Palo Alto Public Works Director, by phone at 650-853-3189 or by email at kfallaha@cityofepa.org if you have any questions about the City comments.

Sincerely,

Sean Charpentier
Assistant City Manager
City of East Palo Alto
2415 University Avenue
East Palo Alto, CA 94303

Cc: Project file
Jaime Fontes, City Manager

State of California – Natural Resources Agency
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GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

Letter A3

June 25, 2019

Mr. Kevin Murray
San Francisquito Creek Joint Powers Authority
615 B Menlo Avenue
Menlo Park, CA 94025

Subject: San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101, Draft Environmental Impact Report, SCH #2013062019, Santa Clara County and San Mateo County

A3-1

Dear Mr. Murray:

The California Department of Fish and Wildlife (CDFW) received a Program Draft Environmental Impact Report (EIR) from the San Francisquito Creek Joint Powers Authority (SFCJPA) for the San Francisquito Creek Flood Projection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101 (Project) on April 29, 2019 pursuant to the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.; hereafter CEQA; Cal. Code Regs., § 15000 et seq.; hereafter CEQA Guidelines).

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that are within CDFW's area of expertise and relevant to its statutory responsibilities (Fish and Game Code § 1802), and/or which are required to be approved by CDFW (CEQA Guidelines, §§ 15086, 15096 and 15204). The SFCJPA provided an extension to the deadline for CDFW to submit the comment letter to June 26, 2019.

CDFW ROLE

CDFW is a Trustee Agency with responsibility pursuant to CEQA for commenting on projects that could directly or indirectly impact biological resources. CDFW has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (i.e., biological resources). As a Trustee Agency, CDFW is responsible for providing, as available, biological expertise to review and comment upon environmental documents and impacts arising from project activities (CEQA Guidelines § 15386; Fish and Game Code § 1802).

CDFW is also considered a Responsible Agency under CEQA §15381 if a project requires discretionary approval, such as under the California Endangered Species Act (CESA), the Native Plant Protection Act, the Lake and Streambed Alteration Agreement (LSAA), or other provisions of the Fish and Game Code that afford protection to the State's fish and wildlife trust resources. CDFW will act as a Responsible Agency because it anticipates issuing an LSAA for Project activities that impact a stream (Fish and Game Code, §§ 1600 – 1616), specifically San Francisquito Creek. CDFW may also act as a Responsible Agency in issuing an Incidental Take Permit (ITP) if Project activities result in "take" of any species listed as candidate, threatened, or endangered pursuant to CESA (Fish and Game Code, § 2050 et seq.).

A3-1
Con't

PROJECT DESCRIPTION

Background: The SFCJPA is a regional government agency formed in 1999 by East Palo Alto, Menlo Park, Palo Alto, the San Mateo County Flood Control District, and the Santa Clara Valley Water District. This agency plans, designs, and implements projects along San Francisquito Creek which is divided between San Mateo and Santa Clara counties.

For the purpose of this draft EIR, San Francisquito Creek is considered to have three major and distinct reaches. Reach 1 includes the length of the creek between San Francisco Bay and the upstream side of the bridge at West Bayshore Road. Construction within Reach 1 was completed in 2018 (Environmental Impact Report SCH #2010092048). Reach 2 includes the length of the creek between the upstream side of West Bayshore Road and extends to the area immediately upstream of Pope-Chaucer Bridge. Reach 2 includes the work proposed to occur in the near future as a result of this draft EIR. Reach 3 is upstream of the Pope Chaucer Bridge and extends throughout the upper watershed. Reach 3 is an area subject to potential future projects discussed in this draft EIR would complement the objectives of the work proposed in Reach 2.

Objective: The SFCJPA seeks to sustainably and adaptively manage the watershed system and to increase the conveyance and/or detention of water in order to protect people and property from creek flows of at least the 100-year-event level, now and in a future with climate change. The draft EIR analyzes alternatives that meet this objective at a programmatic level, and conducts a more detailed project level analysis to enable the implementation of the first phase of work in Reach 2 to protect the communities from flows up to the 1998 flood event level.

The specific objectives of the draft EIR are as follows:

- Protect life, property, and infrastructure from floodwaters exiting the creek during flows up to 7,500 cubic feet per second (cfs), while minimizing impacts of the Project on adjacent communities and the environment;
- Enhance habitat within the Project area, particularly interconnected habitat for threatened and endangered species;
- Create new recreational opportunities and connect them to existing bike and pedestrian corridors;
- Minimize operational and maintenance requirements; and
- Not preclude future actions to bring cumulative flood protection up to a 100-year flow event.

Under the draft EIR, 17 alternatives were evaluated and screened based on their ability to meet the Project objectives. For Reach 2, Alternatives 2 (Channel Widening Alternative) and 5 (Floodwalls Alternative) advanced for full analysis in the draft EIR. Both alternatives include replacing the Pope-Chaucer Bridge and widening the channel immediately upstream of U.S. Highway 101 (Site 5) to align the channel with the recently completed modifications to the bridge at the highway's West Bayshore frontage road. For flood protection methods, Alternative 2 would involve primarily creek channel widening, replacing decades-old sacked concrete walls with more vertical, architecturally treated soil nail walls, and Alternative 5 would involve

A3-1 Con't construction of floodwalls at the top of the creek's banks. Both alternatives would include construction of creekside parks and aquatic habitat enhancements. The Channel Widening Alternative was determined to be the preferred alternative. Reach 3 Alternative 3 (Construct One or More Detention Basins) advanced for full analysis in the draft EIR. Alternative 3 was spilt into two alternatives, each representing one of two potential detention basin sites. However, Reach 3 alternatives are analyzed at a program level due to insufficient information at this time.

Timeframe: The draft EIR indicates that the proposed work in Reach 2 would be implemented between June 15 and October 15. Construction would begin in either 2020 or 2021 and take up to two years.

COMMENTS AND RECOMMENDATIONS

CDFW offers the comments and recommendations presented below primarily to assist the SFCJPA in adequately identifying and/or mitigating the Project's significant, or potentially significant, direct and indirect impacts on biological resources. These comments and recommendations are based on the requirement for the environmental document to include the following information:

Project Description

A3-2 Table 2-1. Screening of Alternative Based on Each Alternative's Ability to Meet Project Objectives

The table lists multiple objectives and compares them with the alternative projects (alternatives 2 – 17). To address one concern in particular related to the expected large volume of excavated materials for a project of this scope, and resultant potential need for disposal of excess sediment and other materials, CDFW recommends that the draft EIR include an analysis of the cut and fill balance for each alternative. For those alternatives expected to create a surplus of excavated sediment, the locations of disposal sites (on-site and/or off-site) should be described, and the potential impacts of sediment disposal on biological resources fully analyzed as part of the proposed Project.

Replacement of Pope-Chaucer Bridge and Channel Widening (Reach 2; Section 2.8.2)

A3-3 The draft EIR states that "construction would begin in the spring, with work starting within the stream channel on June 15." The EIR should describe in detail all activities that would occur in the spring for the replacement of the Pope-Chaucer bridge and/or any other activities of the proposed Project. For example, if Project activities are proposed to occur in the spring in upland locations outside of the stream channel, the draft EIR must address all potential impacts of these activities on biological resources, including special-status species and their habitats. Additionally, the draft EIR states that stream vegetation would be removed 250 feet upstream and 250 feet downstream of the bridge to accommodate construction equipment, but it does not describe the type of vegetation or habitat present. The draft EIR should describe all existing habitat types within the Project area, including species composition as well as amounts and types of impacts (temporary, semi-permanent or permanent) resulting from implementation of the Project.

A3-4 The draft EIR states that rock slope protection (RSP) would be installed up- and downstream of the bridge. Although the draft EIR includes some information on the length of the RSP, the amount and height of RSP expected to be used along the banks should be specified as well. Since the draft EIR states that fish habitat would be constructed over the in-channel RSP, CDFW is concerned that this approach could result in fish entrapment. Therefore, please clearly justify the proposed amount of RSP, and evaluate feasible bio-engineering alternatives to minimize the amount of RSP.

A3-5 The draft EIR states soil nail walls would be installed at multiple sites. At Site 5, the bank is proposed to be set back and a sheet pile wall constructed near West Bayshore Road. CDFW recommends evaluating methods of reducing the amount of hardscape and providing more habitat value to these sites. For example, we recommend evaluating the option of laying back the bank to a gentler slope (with installation of plantings) while still retaining the stream capacity or installing wooden crib walls or a similar structure. While the draft EIR indicates that existing sacked concrete is proposed for removal at Sites 3, 4 and 5, it appears to be planned for installation at Site 2. CDFW is concerned that sacked concrete is not typically stable as a long-term bank protection treatment and ends up being uplifted and eroded; therefore, we do not recommend its use. The EIR should therefore evaluate use of other bank stabilization treatments that would reduce or eliminate hardscape.

A3-6

Construction of Small Creekside Parks

Part of the Channel Widening Alternative includes constructing small creekside parks and the draft EIR states that it would include landscaping and benches. The EIR should specify the plant species composition of the landscaping and ensure that plantings are composed of native species only. Since these parks would be near the creek, CDFW recommends that the plant palette for these parks include native riparian species appropriate for the local area. The EIR should also clarify the specific location of these parks, including whether they would be created above or below top of bank.

A3-7

Construction Equipment

The draft EIR states that when vehicles and equipment are not in use, they would be stored within either the "instream" or upland staging areas. However, the draft EIR should clarify whether all vehicles and equipment would be stored within the dewatered area of the channel. Also, the draft EIR states that the instream staging areas are shown in Figures 2-3 through 2-6, but these figures show both the construction area and instream staging combined. The specific location of the instream staging areas should therefore be described and updated figures provided.

A3-8

Dewatering

Construction of the Project would involve dewatering of the creek; however, it is not clear in the draft EIR whether partial dewatering of the creek would be feasible. Partial dewatering could result in less impeded movement for steelhead and other native fish migrating up- and/or downstream.

Operations and Maintenance

A3-9

The draft EIR states that "the Project would require similar maintenance activities as those currently conducted along the creek" and concludes that no impact would occur. However, the draft EIR does not describe current maintenance activities and whether those activities were previously analyzed under CEQA. Unlike construction impacts, which tend to be one-time impacts, operation and maintenance activities are repeated activities that can have cumulative effects. It is not clear if these activities appropriately represent the environmental baseline. Please provide a description of current operations and maintenance activities and cross-reference past CEQA analysis pertaining to those activities to demonstrate that all effects have been analyzed. Additionally, the draft EIR states that sediment deposition as well as other activities would be inspected after construction of the Project. Please clarify how often sediment is currently removed, whether there is a known source, where the sediment is disposed offsite if it cannot be reused, and whether the Project is expected to address excess deposition.

Biological Resources

A3-10

The draft EIR indicates that "construction of the floodwalls could temporarily impact 1.61 acres of riparian habitat (for excavation to build the walls) and permanently impact 0.167 acres (the footprint of the walls)" for the Floodwalls Alternative in Reach 2. While the draft EIR addresses footprint impacts, it does not discuss changes to the stream associated with additional hardscape. For example, a concrete floodwall could result in hydromodification of the channel and alteration of sediment and large wood deposition. CDFW therefore recommends that the EIR include an analysis and discussion of physical changes that might occur as a result of construction of the proposed floodwalls and a discussion of related effects to streamflow and aquatic habitat.

The draft EIR indicates that the Project would result in impacts to several habitat types, including freshwater emergent wetland, coastal oak woodland, valley oak riparian, coastal scrub, and saline emergent wetland. However, the draft EIR does not clearly define temporary and permanent impacts nor explain how some of these habitat types could meet the criteria of a temporary impact, which includes complete restoration of the impact area to pre-project conditions within one year of the impact. Habitat types such as seasonal wetland or willow riparian typically cannot typically be fully restored to their pre-project value or function within one year of removal or other disturbance. Please be advised that if a habitat type cannot be fully restored to pre-project conditions within one year, CDFW considers this impact as either semi-permanent (restoration within two years) or permanent (more than two years). CDFW recommends that the EIR fully evaluate the type and duration of impacts for each habitat type within the Project area and provide compensatory mitigation appropriate for each type of impact. For example, mitigation for semi-permanent impacts should be higher than those for temporary impacts in order to offset the temporal loss of habitat functions and values to fish and wildlife species.

However, CDFW questions the accuracy of the habitat assessment included in the draft EIR and its evaluation of impacts to biological resources given that habitats for wildlife and plant species were assessed in years 2010, 2012 and 2013. Given the time since the last

A3-10 Con't

reconnaissance surveys were conducted, the potential exists for special-status species not observed during the last surveys to occupy the Project area. The draft EIR should re-evaluate the habitat types within the Project area and include a more accurate and updated description of baseline conditions. If suitable habitat still exists for special-status and sensitive plant and wildlife species, then surveys should be conducted and survey results included in the EIR. The draft EIR indicates that the California Natural Diversity Database (CNDDB) as well as other databases were accessed to identify all special-status species that could occur in the Project area. It is not clear when the databases were accessed. As indicated above, if databases prior to conducting surveys six or more years ago, CDFW advises re-consulting data sources and including the most current results in the EIR.

A3-11

The draft EIR also does not clearly describe the number of trees expected to be impacted by Project construction activities, and whether these trees are located within the riparian corridor or in upland locations. Appendix B focuses on trees that would be impacted on private property, but a more thorough evaluation of all tree impacts should be included in the EIR. In addition, the draft EIR states that to compensate for any tree removal, planting of new trees would be in accordance with each city's tree ordinances. Please be advised that impacts to riparian vegetation would be subject to Fish and Game Code 1600 et seq. (see **Regulatory Requirements** below) and compensation required in an LSAA. The EIR, however, must include more defined mitigation measures to effectively compensate for all impacts to both riparian and upland vegetation.

A3-12

Please be advised that monitoring of vegetation is typically 5 to 10 (or more) years, depending on the plant palette. Some plant species such as oaks typically have very slow growth rates. Additionally, the biological functionality of oak woodlands may be impacted by thinning or clearing due to loss of wildlife roosting and nesting trees, encroachment by conifers, loss of acorn mast trees, and other factors. The draft EIR should clearly describe all impacts to oak woodlands and include a mitigation and monitoring plan that would adequately account for species with slow growth rates.

A3-13

Table 3.3.-4 in the draft EIR shows that the Federally Threatened (FT) and State Species of Special Concern (SSC) California red-legged frog (CRLF) (*Rana draytonii*) has the potential to be impacted by the Project in Reach 2, but the FT and State Threatened (ST) California tiger salamander (CTS) (*Ambystoma californiense*) is only included in Reach 3 (see next paragraph). CDFW recommends further assessment of the potential for CTS to occur in Reach 2. Mitigation Measure BIO-25 in the draft EIR proposes to conduct surveys of upland habitat and avoid CTS if found. However, the draft EIR doesn't specify whether protocol-level surveys would be conducted. Similarly, CDFW advises that it is very difficult to fully avoid impacts to CTS. If CTS breeding ponds are located within 1.3 miles of Reach 2 of the Project area and suitable upland habitat is present between breeding ponds and the construction site, then the SFCJPA should consider CTS as present in Reach 2 and assess the Project's potential for take of this CESA-listed species (see **Regulatory Requirements** below).

For Reach 3, the draft EIR indicates that the detention basins could attract breeding CRLF and CTS, which would be subject to take during sediment removal activities. Mitigation Measure BIO-19 proposes to construct an impermeable fence around the basin to prevent CRLF and

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CTS from entering the basins. CDFW is concerned that MM-BIO-19 is unlikely to be effective. Fencing and barriers require almost daily maintenance, and as such are costly and prone to failure. Even if carefully maintained, frogs are good climbers, and the exclusion fence may not fully exclude them. Barriers can also result in mortality, particularly for CTS, because individuals encountering an obstacle, rather than moving in a different direction, stop against the barrier, and often die from desiccation. As an alternative to exclusion fencing, the EIR should analyze feasible and effective alternatives such as sizing the basin and managing the hydroperiod for no more than 48 hours so that CTS and CRLF are not attracted to the feature for breeding.

A3-14

The draft EIR states that habitat for the Federal Candidate (FC) and ST longfin smelt (*Spirinchus thaleichthys*) is absent. CDFW recommends that a more thorough habitat assessment be conducted for longfin smelt and that Table 3.3-3 be revised, if necessary. Please be advised that pile driving impacts could result in take of longfin smelt if they are present within the Project area during construction and an ITP may be necessary.

A3-15

The draft EIR states that "the project area is situated entirely in an intergrade zone of snakes that are genetic hybrids of San Francisco garter snake (SFGS) (*Thamnophis sirtalis tetrataenia*) and red-sided garter snake (*Thamnophis sirtalis parietalis*); these intergrades are not considered to belong to either species and are not protected as such…" The draft EIR does not provide a citation explaining the basis for this assumption. Please be advised that CDFW does not have an adopted policy for hybrid species and was not consulted regarding the Fully Protected (FP) status for SFGS in this area. CDFW recommends that this text be removed or that consultation with CDFW occur in order to modify this language.

A3-16

The draft EIR states that habitat for the FP salt marsh harvest mouse (SMHM) (*Reithrodontomys raviventris*) is absent. In order to better assess the potential direct and/or indirect impacts of the Project to this species, the EIR should consider the proximity to Reach 1 and the staging area within this reach when considering whether habitat is present for SMHM. The EIR should also consider this for the SSC salt-marsh wandering shrew (*Sorex vagrans halicoetes*), the FP California Ridgway's rail (*Rallus obsoletus obsoletus*), and the FP California black rail (*Laterallus jamaicensis conturniculus*). In addition, the draft EIR states that there would be no impact to San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*) in Reach 2 because this species does not occur in this area. However, the EIR should more clearly justify this determination since woodrat nests are often cryptic yet relatively common in riparian vegetation located in urbanized settings.

Please note that Townsend's big-eared bat (*Corynorhinus townsendii*) is no longer a state candidate species under CESA. This species is an SSC.

A3-17

REGULATORY REQUIREMENTS

California Endangered Species Act

Please be advised that a CESA Permit must be obtained if the Project has the potential to result in "take" of plants or animals listed under CESA, either during construction or over the life of the Project. Issuance of a CESA Permit is subject to CEQA documentation; the CEQA document must specify impacts, mitigation measures, and a mitigation monitoring and reporting program. If the Project will impact CESA listed species, early consultation is encouraged, as significant modification to the Project and mitigation measures may be required in order to obtain a CESA Permit. For more information on CESA and the ITP application process, please visit our website at: http://www.wildlife.ca.gov/Conservation/CESA.

CEQA requires a Mandatory Finding of Significance if a project is likely to substantially impact threatened or endangered species [CEQA §§ 21001(c), 21083, and CEQA Guidelines §§ 15380, 15064, 15065]. Impacts must be avoided or mitigated to less-than-significant levels unless the CEQA Lead Agency makes and supports Findings of Overriding Consideration (FOC). The CEQA Lead Agency's FOC does not eliminate the Project proponent's obligation to comply with Fish and Game Code § 2080.

Lake and Streambed Alteration Agreement

CDFW will require an LSAA, pursuant to Fish and Game Code §§ 1600 et. seq. for Project-related activities within San Francisquito Creek and any other waters within the proposed Project area subject to 1600 et seq. Notification is required for any activity that will substantially divert or obstruct the natural flow; change or use material from the bed, channel, or bank including associated riparian or wetland resources; or deposit or dispose of material where it may pass into a river, lake or stream. Work within ephemeral streams, washes, watercourses with a subsurface flow, and floodplains are subject to notification requirements. CDFW, as a Responsible Agency under CEQA, will consider the EIR for the Project. CDFW may not execute the final LSAA until it has complied with CEQA (Public Resources Code § 21000 et seq.) as the responsible agency.

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ENVIRONMENTAL DATA

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a database which may be used to make subsequent or supplemental environmental determinations. [Pub. Resources Code, § 21003, subd. (e)]. Accordingly, please report any special-status species and natural communities detected during Project surveys to CNDDB. The CNNDB field survey form can be found at the following link: https://www.wildlife.ca.gov/Data/CNDDB/Submitting-Data. The completed form can be mailed electronically to CNDDB at the following email address: CNDDB@wildlife.ca.gov. The types of information reported to CNDDB can be found at the following link: https://www.wildlife.ca.gov/Data/CNDDB/Plants-and-Animals.

FILING FEES

The Project, as proposed, would have an impact on fish and/or wildlife, and assessment of filing fees is necessary (Fish and Game Code, § 711.4; Pub. Resources Code, § 21089). Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW.

CONCLUSION AND FUTURE COORDINATION

A3-17 Con't CDFW appreciates the opportunity to comment on the draft EIR to assist the SFCJPA in identifying and mitigating Project impacts on biological resources. Questions regarding this letter or further coordination should be directed to Ms. Mayra Molina, Environmental Scientist, at (707) 428-2067 or Mayra.Molina@wildlife.ca.gov; or Ms. Brenda Blinn, Senior Environmental Scientist (Supervisory), at (707) 944-5541 or Brenda.Blinn@wildlife.ca.gov.

Sincerely,

Gregg Erickson
Regional Manager
Bay Delta Region

cc: State Clearinghouse #2013062019

ec: Ms. Susan Glendening
San Francisco Regional Water Quality Control Board
Susan.glendening@waterboards.ca.gov

Mr. Gary Stern
NOAA Fisheries
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CALIFORNIA
Water Boards

Gavin Newsom
Governor

Jared Blumenfeld
Secretary for
Environmental Protection

San Francisco Bay Regional Water Quality Control Board

Letter A4

Sent via electronic mail: no hard copy to follow

June 26, 2019
CIWQS Place ID 833044

San Francisquito Creek Joint Powers Authority
Attn. Mr. Kevin Murray, Senior Project Manager
615-B Menlo Avenue
Menlo Park, CA 94025
email: comments@sfcjpa.org

Subject: Comments on *Draft Environmental Impact Report for the San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101*, Counties of San Mateo and Santa Clara (State Clearinghouse No. 2013062019)

Dear Mr. Murray:

San Francisco Bay Regional Water Quality Control Board (Water Board) staff appreciates the opportunity to review the subject draft environmental impact report (DEIR), prepared by the San Francisquito Creek Joint Powers Authority (JPA) pursuant to the California Environmental Quality Act (CEQA). As a responsible agency under CEQA, we offer the following comments on the DEIR. They are intended to support development of the project's design, evaluation of its potential environmental impacts, and the Water Board's future review of applications to authorize project construction. The DEIR assesses anticipated environmental impacts from constructing a flood management project in San Francisquito Creek. A4-1

Setting

San Francisquito Creek (Creek) forms the boundary between San Mateo and Santa Clara counties from San Francisco Bay (Bay) upstream to just below the Searsville Dam, at Stanford University. For purposes of the DEIR, the Creek is divided into three reaches: Reach 1 is from the Bay to Highway 101 (101); Reach 2 is from 101 to the Pope-Chaucer Bridge; and Reach 3 is from the Pope-Chaucer Bridge to the top of the Creek. The proposed project is intended to reduce flooding in East Palo Alto and Menlo Park in San Mateo County, and Palo Alto in Santa Clara County, from up to the 7,500 cubic foot per second (cfs) flow event (Project). The DEIR evaluates Project-specific

Dr. Terry F. Young, chair | Michael Montgomery, executive officer

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improvements in Creek Reach 2 (about 7,800 linear feet (LF)). In addition, the DEIR is intended as a program-level evaluation of potential future improvements in Reach 3, upstream of Reach 2, that could provide additional flood management benefits.

Reach 2 is incised with steep slopes and is surrounded by dense urban land use. However, the Creek remains relatively unmodified except for bridge crossings and spot bank treatments with concrete and sacked concrete. The Creek's riparian corridor, including the banks, is densely vegetated with mature native and nonnative species forming diverse canopy structures in the channel and on the banks. Reach 2 is an important migration corridor for the Central California Coast distinct population segment of steelhead (*Oncorhynchus mykiss)*. Fish passage through Searsville Dam is being studied to open access to undeveloped watersheds and headwaters upstream of the dam. The steelhead run in the Creek has been classified as an essential population in the 2016 *Final Coastal Multispecies Recovery Plan* (NMFS 2016). The Creek's beneficial uses designated in the San Francisco Bay Basin Water Quality Control Plan (Basin Plan) are Cold Freshwater Habitat (COLD), Fish Migration (MIGR), Fish Spawning (SPWN), Preservation of Rare and Endangered Species (RARE), Warm Freshwater Habitat (WARM), Wildlife Habitat (WILD), Water Contact Recreation (REC1), and Noncontact Water Recreation (REC2). The DEIR should recognize and propose measures to appropriately protect the Creek's existing functions and values as indicated, in part, by the Creek's designated beneficial uses. Our comments recognize information already in the DEIR, and include suggestions for information and analyses to include to ensure the Project is appropriately protecting the Creek.

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Protection and enhancement of these beneficial uses would preserve or improve the Creek's habitat for salmonids and other listed species in Reach 2, including the California red-legged frog, California tiger salamander, and western pond turtle, and a variety of other aquatic and terrestrial wildlife and plant species (DEIR, p. 3.3-33-41, Table 3.3-2-*Special-Status Plant Species with Potential to Occur in the Project Footprint*), as well as the personal enjoyment and sense of place the Creek provides to community members.

DEIR Overview

The DEIR evaluates two alternatives: the Channel Widening Alternative, and the Floodwalls Alternative; and screens out 15 other alternatives, including the No Construction Alternative. For both evaluated alternatives, Creek capacity would be increased by widening the Creek at the Pope-Chaucer Bridge and replacing the existing concrete-bottom bridge, and widening the channel at Site 5, next to Highway 101, by removing existing sacked concrete. For the Channel Widening alternative, Sites 1 through 4 would also be widened by removing existing concrete and sacked concrete and excavating the banks (about 1,624 linear feet (LF) would be modified). For the Floodwalls Alternative, 7,260 linear feet of concrete floodwalls up to two feet tall would be constructed on the tops of the banks. Both alternatives include potential aquatic habitat restoration and recreational enhancements. Specifically, habitat diversity would be added.

A4-2 We support alternatives that would remove hydraulic constrictions that cause sedimentation and reduce the need for maintenance that results in recurring impacts to the Creek. In addition, we appreciate that the DEIR indicates that both alternatives analyzed would include aquatic habitat enhancements such as J-weirs and large woody debris, which would add complexity, and refuge from high flow velocities. Both alternatives would also include recreational enhancements with construction of two pocket parks next to the Creek, which would support the REC2 beneficial use

A4-3 However, though the preferred project would remove sacked concrete and concrete at the five widening sites and the Pope-Chaucer Bridge, new hardscape including concrete, rock riprap, and sheet piles would replace the removed materials along about 1,800 linear feet of Creek banks. These aspects of the Project design are likely to permanently degrade the benefits provided by the existing vegetation, some of which is growing on the sacked concrete banks. Such benefits include nutrient cycling, shade, cover from predators, and a variety of foraging and rearing habitat niches for fish, invertebrates, reptiles, amphibians, and birds. The proposed concrete soil nail walls could increase erosion and degrade the Creek's habitat complexity. The rock riprap proposed at the Pope-Chaucer Bridge for both the Channel Widening and Floodwalls alternatives would replace the existing natural banks, which would reduce existing habitat complexity. During construction, vehicles driving in the channel may compact the Creek bed. Construction would also result in the removal of vegetation over at least 5.2 acres and 6,385 linear feet of the Creek. With reduced channel complexity, vegetation removal, and bed compaction, the Project is likely to degrade the COLD, WARM, RARE, SPWN, MIGR, WILD, and REC2 beneficial uses.

A4-4 We appreciate that both alternatives analyzed have potential aquatic habitat restoration features such as large woody debris and J-weirs to increase habitat complexity and provide flow refugia. However, the DEIR does not yet include enough information on whether those features could adequately mitigate for the Project's significant environmental impacts. The types of information the DEIR should be revised to include are the locations, areal extents, and conceptual designs of the features, and evaluations of whether they would affect the Creek's hydrology and hydraulics, including stability of bank stabilization treatments. Specifically, a shear stress analysis should be conducted to justify the choice of bank stabilization treatments, and to demonstrate whether the bank stabilization treatments may have the unintended potential to introduce new destabilizing forces in Reach 2. The analysis should incorporate the influences of the aquatic habitat enhancements being considered for the Project.

We recommend the JPA consult with the Water Board and other agencies to verify agencies concur with the JPA's findings before finalizing the EIR. We elaborate on the Project's impacts and DEIR findings in the following points.

1. Geomorphic Analyses Required for Basis of Design

A4-5 We support removal of the concrete and sacked concrete at the five channel widening sites because they restrict Creek functions that support the Creek's beneficial uses. The DEIR should be revised to include information to support the choice of concrete and sheet pile bank stabilization treatments in the preferred alternative, as opposed to potentially less-impacting biotechnical bank protection measures.

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Accordingly, the JPA should conduct geomorphic modeling to inform the DEIR alternatives, and include the results of the modeling in the DEIR. This is necessary to determine the near bank shear stress values, and to describe the geotechnical characteristics of any stream bank materials to be used in the Project. Such analyses should include evaluations of bank erosion patterns, intensities, and activity levels. The mechanical and hydrologic effects of existing mature vegetation on bank stability (Simon et al., 2001[1]) should also be assessed to guide selection of bank stabilization techniques. Finally, constraints related to existing infrastructure, such as distance of utility lines from the top of bank, need to be presented and described to determine constraints related to the steepness of finished slopes and hence the types of bank stabilization treatments that may be feasible. We appreciate that Appendix D, *Hydrology Report,* includes hydrology computer modeling results with flow velocity information in Reach 2. We would expect a similar level of analysis for all Project design elements, including a shear stress analysis to inform the bank stabilization treatments.

Further, the choice of a soil nail wall to stabilize banks after removing bank widths up to 25 feet at the channel widening sites, must be informed by appropriate geomorphic modeling. The DEIR should include discussion of the results of a geomorphic analysis sufficient to demonstrate whether other less-impactful methods are practicable and would achieve the same flood protection goals.

A4-6

2. Environmentally Superior Alternative.

A less impactful approach for bank stabilization could use a combination of less excavation of the bank cross-sections, live bioengineering methods, and low floodwalls on the tops of banks—this is similar to the approach proposed at channel widening Site 2. Such an alternative could be an environmentally superior alternative because it could perform as well or better than any other alternative considered in the DEIR per project objectives for flood protection, minimize impacts on adjacent communities, create new recreational opportunities, and have less operation and maintenance, while protecting or enhancing the Creek's ecological functions.

For instance, the Channel Widening Alternative or the Floodwalls Alternative could be combined with soil biotechnical bank stabilization, rather than soil nail or sheet pile walls, at the streambank locations proposed for widening in these alternatives. Live crib walls, fabric reinforced earth fills, or brush mattresses with toe riprap may be feasible soil biotechnical bank stabilization methods as alternatives to soil nail walls, considering streambank information presented in the DEIR. This could result in a significant long-term enhancement of stream-riparian habitat complexity and connectivity, and could, therefore, substantially improve the Creek's existing incised and simplified physical

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[1] Simon A., N. Pollen-Bankhead, and R.E. Thomas, 2011. Development and application of a deterministic bank stability and toe erosion model for stream restoration. In *Stream Restoration in Dynamic Fluvial Systems*, Simon A, Bennett SJ, Castro JM (eds). American Geophysical Union: Washington, DC. DOI.

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habitat structure. When the Water Board considers the Project's authorization, we will consider how the Project appropriately maximizes these approaches.

Other soil biotechnical methods also may be feasible, especially if considered together, as needed, with flow-redirection techniques like engineered log jams. These elements could also be effective in scouring deep pools that would improve habitat and increase cross-sectional area, and could provide structural protection at the bank toe. An excellent summary of stability thresholds for stream bank materials and soil bioengineering techniques is available in Fischenich (2001[2]), which could serve as a guide for considering the practicability of biotechnical measures in this project.

An Environmentally Superior Alternative could also include creation of pool-riffle habitat units throughout the channel reaches accessed for construction. If live crib walls, fabric reinforced earth fills, or brush mattresses are practicable alternatives to soil nail walls, they would be environmentally superior because they can support organisms and herbaceous vegetation, thus contribute to habitat functions and values and supporting a more-resilient and diverse ecosystem.

A4-7

The DEIR indicates the JPA is considering incorporating aquatic habitat restoration elements into the Project by adding J-weirs, root wads, boulders, and other features. However, the DEIR lacks details necessary for us to evaluate or, ultimately, approve these features. We recommend the DEIR be revised with concept design renderings of all proposed enhancement and restoration features, and locations. In addition, the relevant geomorphic analyses mentioned above should account for the presence of these features and evaluate the proposed design's appropriateness.

A4-8

Finally, of the two alternatives analyzed in the DEIR, the Floodwalls Alternative to be less impactful to jurisdictional waters of the State because it results in less hardening of the creek bed and banks. Floodwalls have been posed to community members in the past, and were not favorably received. However, the versions previously discussed were taller and thus aesthetically unacceptable. The Floodwalls Alternative's low floodwall heights are more likely to be acceptable to the community, especially when combined with more-natural bank stabilization treatments in our suggested hybrid approach for bank stabilization and channel restoration.

A4-9

3. Existing Conditions Along the Project Reach

CEQA Guidelines section 15125 states that the EIR must include a description of the physical environmental conditions in the vicinity of the project, from both a local and regional perspective. Thus, in the DEIR, the JPA should define the baseline hydrologic, geomorphic, and biotic conditions in Reach 2 (where the draft EIR is intended to provide a project-level analysis) and how they relate to the Creek's designated beneficial uses (Basin Plan Table 2.1). The DEIR appropriately noted the Creek's beneficial uses (p.

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[2] Fischenich, C. (2001). Stability thresholds for stream restoration materials. Technical report EMRRP SR-29, Vicksburg, MS: USACE ERDC, Environmental Laboratory.

A4-9 Con't 3.8-18), yet did not characterize their significance in the Project or how the Project actions would protect or enhance the beneficial uses.

The DEIR should characterize the baseline condition of Creek's stream and riparian habitat in Reach 2 at a greater level of detail, which will facilitate the DEIR's consideration of potential impacts, and approaches to avoid, minimize, and mitigate them. The DEIR notes that steelhead presence is assumed because of "juvenile presence studies and spawning data" (p. 3.3-42). The DEIR should at least summarize the results of a baseline stream habitat survey or a juvenile steelhead census conducted in winter and spring baseflow conditions. This would inform the Project's effects and potential significant impacts to the RARE, COLD, MIGR, and SPWN beneficial uses.

A4-10 In addition, based on review of unpublished drone video photography (JPA presentation to Water Board, May 29, 2019; and May 23, 2019, community meeting) and previous site visits, mature riparian trees and understory vegetation have become well-established over extensive areas of sacked concrete walls. Numerous mature native species, including willows, oak, and California buckeye, also have become established near the toes of the streambanks within the bankfull channel and at the tops of banks. The trees that are established within the bankfull channel locally focus and separate high flows contributing to the formation of pool-riffle-bar habitat units, preferential sorting of the streambed, and retention of gravel. Small boulders and bridge crossings within Reach 2, also create locally complex hydraulics that cause pool-riffle-bar units to form. The only other locations in the video footage where pool-riffle-bar units were observed appear to be where the Creek bends.

With these observations, and considering the wide interannual variation in the size and frequency peak flows in San Francisquito Creek, we would infer:

a. Under the environmental baseline Reach 2 provides suitable conditions for adult and juvenile steelhead/rainbow trout migration. Depending upon the typical depth of pools (which could not be discerned in the video), it is possible that habitat quality under the baseline, as related to migration is good. In addition, steelhead have been observed spawning in Reach 2[3], though we recognize Reach 2 is primarily a migration reach, especially when considering future fish passage clearance planned at Searsville Dam.

b. In addition to functioning as a migration corridor, Reach 2 may also provide over-wintering habitat for juvenile steelhead in velocity shelters/refuge habitats provided by: exposed roots in undercut banks located on outside bends; within the matrix of small debris jams; and within exposed roots of mature native riparian trees growing within the streambed (all of these features also are visible

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[3] "Spawning 26" Steelhead trout in San Francisquito Creek, February 21, 2013 observed on the section below the Chaucer Street bridge and along Woodland Avenue." (Doug Drundle, February 21, 2013). Online: https://www.youtube.com/watch?v=B-JWIZP8rY0; accessed June 7, 2019).

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in the video footage). If pool depths are greater than 3 feet in this reach, then it appears that over-winter habitat quality may be locally suitable (as most of the pools observed had very good instream and overhead cover).

The DEIR should include analyses to show how the Project alternatives and construction activities would avoid and minimize impacts to these beneficial features. If significant impacts to these features would be unavoidable, the DEIR should include appropriate mitigation.

A4-11

Therefore, the EIR should provide a more detailed summary of baseline channel and riparian habitat and functions in Reach 2 for different life stages and under winter and spring baseflow conditions, with attention to the Creek's beneficial uses pursuant to the Basin Plan, such as at DEIR, p. 3.3-43, which ignores or downplays the Creek's existing beneficial uses:

> *"The creek reach that extends from San Francisco Bay to Junipero Serra Boulevard is used as a migration corridor for spawning adult steelhead and an emigration corridor for juvenile fish (NMFS 2008). Steelhead have not been observed spawning in this portion of San Francisquito Creek and overwintering and summer rearing habitats are limited due to a low density of habitat features such as woody material, root wads, boulder and cobble aggregations, and off-channel habitats (Jones and Stokes 2004, NMFS 2008)."*

The DEIR should also present a more-detailed assessment of sediment conditions and sediment transport processes. We would also expect the DEIR to be revised with more specific information from the hydraulic models referenced generically throughout the DEIR, and the personal communication from Mr. Xu (p.3.8-21). This type of information is necessary to justify the Project design, and therefore is needed to fully characterize the potential Project impacts.

A4-12

4. Significance Criteria for Biological Resources

Please clarify significance criterion Impact-BIO-4, *Result in temporary and permanent changes to waters of the U.S. (intermittent drainage).* We are not able to interpret which CEQA checklist criterion or criteria this is meant to address. Also, please explain what "intermittent drainage" means with respect to the Project's location in the Creek.

A4-13

Please note that the significance criteria for Biological Resources in the 2019 CEQA Statute and Guidelines were updated to read as follows (underline and strikeout text shows the changes):

> "Have a substantial adverse effect on <u>state or</u> 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?"

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The DEIR does not yet fully address impacts to waters and riparian areas subject to State jurisdiction by the Water Board and the California Department of Fish and Wildlife (CDFW) (e.g., creek channels above the Ordinary High Water Mark and top of bank riparian vegetation), because it does not yet clearly identify those areas. Please revise the DEIR to fully address waters of the State, and revise Impact-BIO-4 to include waters of the State, or, if needed, include a new significance criterion comparable to BIO-4 for all waters of the State.

A4-14

5. Aquatic Habitat Restoration

Designs for the proposed aquatic habitat restoration elements are at a conceptual stage. While these elements are not presented as “mitigation” in the DEIR, they might help to compensate for the Project’s potential impacts. In addition, the conceptual mitigation plan does yet not contain sufficient detail to demonstrate whether their benefits to habitat functions and values would be sufficient to offset the Project’s impacts. CEQA requires that mitigation measures for each significant environmental effect be adequate, timely, and resolved by the lead agency. To be adequate, the DEIR must clearly describe the mitigation measures, show that they are feasible, and explain how they will be enforceable through permit conditions, agreements, or other legally binding instruments. Mitigation measures to be identified at some future time are not acceptable. Otherwise, mitigation measures would be inadvertently and improperly exempted from the process of public and governmental scrutiny required under CEQA. The DEIR should be revised with the details necessary to evaluate the aquatic habitat restoration elements, including the locations, areal extent, and types of restoration that would be incorporated in the Project. In addition, the DEIR should include a requirement for a Project maintenance and monitoring program to protect and maintain the aquatic habitat restoration elements.

We recognize that Project designs and the associated level of detail increases over time. A benefit to providing more detail now is increasing the certainty that the DEIR fully addresses potential impacts and needed mitigation. In addition, when we subsequently consider issuance of an authorization for the Project, we will need to review design plans that are at a level of detail sufficient to allow us to ensure the Project complies with state water quality standards. Providing more detail now, to the extent that is possible, can reduce the work needed subsequently.

A4-15

6. Project Impacts

The Project’s temporary and permanent impacts are not yet fully defined or quantified, and the DEIR should be revised to include additional information on them. Although the DEIR has maps and figures to show construction activities, additional clarification is needed to clearly show the impacts and mitigation areas and habitat types (e.g., stream, riparian habitats). For example, the following DEIR language is unclear or lacks details sufficient for us to concur that impacts have been appropriately identified:

- The DEIR states that there would be no impacts to designated beneficial uses from the Project, based on significance criterion Impact-HWR-4. We disagree with this finding because, as described below in more detail, the Project would result in

A4-15 Con't extensive impacts to riparian vegetation, excavation and fill discharges, and compaction from construction activities in the Creek bed. The Project therefore has potential to adversely affect the COLD, WARM, MIGR, SPWN, RARE, and REC-2 beneficial uses. The DEIR should be revised to address these potential impacts.

- The DEIR states that impacts from construction activity by heavy equipment operating in the channel, and removing in-channel vegetation, would be less than significant (p. 3.3-70):

> "Heavy equipment working and being stored in the channel would impact the channel bottom by compacting the substrate. Additionally, in-channel vegetation may be removed to allow access for heavy equipment. Approximately 5.2 acres or 6,385 linear feet of intermittent drainage that are nonwetland waters of the US could be temporarily disturbed. It is expected that compacted areas would recover during flood events, disturbed areas would naturally revegetate, and the effect would be less than significant."

A4-16 The DEIR finding of "less than significant" is not supported by the conclusory analysis provided, and we disagree that compaction and vegetation removal impacts would be less than significant. The Creek bed, sediment matrices, and vegetation cover are important factors in steelhead streams as spawning gravel sources, habitat complexity for rearing and foraging, and cover from predators and shade. In addition, the impacts of removing mature riparian vegetation may be significant. Stream pool frequency and quality are likely to be reduced by removing the benefits provided by mature riparian trees in the streambed that control or contribute to formation of forced pool-riffle-bar habitat units. Recovery to pre-Project conditions is likely to require up to 10 years due to the need to reestablish a similar riparian vegetative canopy, and possibly longer to reestablish the instream physical habitat benefits. The DEIR should be revised to address these potentially significant impacts, including quantifying them and including appropriate construction-stage monitoring and mitigation measures.

- The DEIR appropriately notes that "[t]hreats to steelhead habitat in San Francisquito Creek include channel modification from flood water conveyance, which includes bank protection measures" (p. 3.3.-43). Accordingly, the Project would degrade the Creek's COLD, MIGR, and SPWN, and RARE beneficial uses. The DEIR should be revised to fully evaluate this impact. The DEIR should be revised to fully evaluate this impact. In addition, the project design should maximize the use of less-impacting design approaches, such as biotechnical stabilization measures, and incorporate the results of analytical tools like a shear stress analysis to justify proposed design approaches. A4-17

- The DEIR should be revised to provide more specificity in its discussion of impacts to riparian vegetation. For example, the DEIR states: "Vegetation at the bottom of the channel would be cleared as needed to allow for vehicle movement and construction" (p. 2-3). In addition, there is a large, unquantified, area of riparian A4-18

A4-18 Con't habitat proposed to be permanently impacted with rock riprap, and a large, unquantified, amount of riparian vegetation including tree canopy proposed to be removed. It seems likely that the riparian vegetation that would be removed for Project construction is greater than the 15 trees listed in DEIR Appendix B, *San Francisquito Creek Tree Impacts* (Tree Report). Those are the trees that would be removed to construct the concrete soil nail walls. The DEIR identifies a permanent impact to 3,000 square feet on waters of the U.S. under Pope-Chaucer Bridge. However, there is little information on the nature and extent of impacts to vegetation associated with that 3,000-square-foot impact, although the DEIR does reference the presence of mature oak trees that will be removed. All of the impacts to riparian vegetation in the creek channel and the tops of banks should be clearly characterized and quantified in the DEIR. The DEIR should include maps that clearly mark the impacted vegetation, as well as vegetation to remain (table format would also be helpful). Accounting of vegetation impacts must include the areal extent of impacts and species affected including non-native species as they pertain to the Creek's beneficial uses such as shade, cover from predators, and nesting, which contribute to the Creek's overall functions and values for the COLD, WARM, WILD, and REC-2 uses.

- A4-19 The DEIR's findings of significant impacts are in some cases conclusory or do not yet fully address the stated criterion. The DEIR significance criteria should be refined after the information to address our comments above is available. For example, for Impact-BIO-2, *Result in disturbance or loss of sensitive natural communities, including riparian habitat*, the DEIR states this impact would be less than significant with mitigation (LTSM) for construction and less than significant (LTS) for operations. However, this criterion is too narrowly focused on certain plant species covers or plant community types, rather than evaluating the riparian habitat holistically, and is focused on temporary construction impacts. The DEIR should be revised to further evaluate impacts on functions and values including, but not limited to, shade, cover from predators, nesting, and nutrient cycling. In addition, we recommend the DEIR be revised to address the impacts of the Channel Widening Alternative on the riparian corridor, including the impacts of channel widening, bank excavation, and bank stabilization treatments such as concrete armoring with soil nail walls. Such revisions are necessary to address (for example) the impacts on the COLD, WARM, MIGR, SPWN, RARE, WILD, and REC2, beneficial uses.

- A4-20 Similarly, the DEIR focuses narrowly on the construction-related impacts of sedimentation during construction and has a finding of LTSM, and LTS for operations, for Impact-BIO-6, *Result in effects on steelhead trout and suitable habitat*; Impact BIO-7, *Result in effects on California red-legged frog and habitat*; Impact BIO-8, *Result in effects on western pond turtle and habitat*; Impact BIO-10, *Result in effects on nesting migratory birds and raptors*. The DEIR should be revised to address the impacts of the Channel Widening Alternative on the habitat features that support these species. This is necessary to address the Project design's impacts on the COLD, WARM, REC2, and WILD beneficial uses.

A4-21
- Please clarify whether proposed soil nail walls would impact the tree roots of existing trees. The DEIR Tree Report states that the highest nail would be installed at about five feet below grade, and that most tree roots are in the top three feet of soil. Please provide the typical root depths for the trees that that are within the construction zone of the nails for the proposed soil nail walls. The Tree Report author recommends to note these tree roots during excavation and to adjust soil nails to avoid them. Please clarify the degree to which this is feasible during construction. As noted above, Further, we recommend the JPA maximize the use of biotechnical stabilization methods where practicable.

A4-22
- The DEIR (p. 3.8-12) states: "Currently, the [Creek] banks are subject to erosion, particularly in response to high discharges, where bank instability is present, or where vegetation becomes disturbed." The DEIR later identifies erosive soils as Impact GEO-5, *Result in substantially accelerated soil erosion or loss of topsoil* (p. 3.5-43), and proposes to monitor 11 potential erosion sites (DEIR Table 3.8-2; Figure 3.8-2). The DEIR should clarify the Project's impacts on bank stability and the potential to trigger or exacerbate bank erosion. Further, the Project should include measures to avoid or minimize this potential adverse impact. We recognize this may entail additional modifications in the Creek, and support the JPA working with other property owners if encroachment on private properties or other agency rights-of-way may be necessary. The DEIR uses mitigation measure MM-HWR-1, *Preparation of an Adaptive Management Plan*, to be prepared in the future, to address this potential impact. We disagree with the DEIR finding that the proposed mitigation would adequately address the potential impact, because the DEIR does not yet include sufficient detail about the Plan's contents and structure. In the absence of sufficient framing information, mitigation as a concept plan does not comply with CEQA. Regarding the number of erosive watch-sites, the DEIR refers to 11, 12, and 13 erosion-watch sites (e.g., see p. 3.5-44). Please clarify if references to 12 or 13 sites are typographic errors that should be corrected to 11, and clarify the number of erosive watch sites if the proposed Project progresses to the point that would result in Impact-GEO-5 occurring.

A4-23

7. Adaptive Management Plan and Other Mitigation Issues

Mitigation measure MM-HWR-1, *Preparation of an Adaptive Management Plan*, refers to the JPA's plan to prepare an adaptive management plan to mitigate impacts to temporary and permanent changes to waters of the U.S. (Impact BIO-4); impacts from accelerated soil erosion or loss of topsoil (Impact GEO-5); and impacts from degrading water quality (Impact HWR-3). In addition, the DEIR relies on an adaptive management plan to identify potential impacts associated with Stanford's project at Searsville Dam (3.8-41). However, the proposed Adaptive Management Plan would be prepared in the future, and the DEIR does not provide a list of required or proposed content, such as issues to address, management goals, and potential actions. Further, when the Water Board considers the Project's permit application, the Project site's existing conditions and the Project's potential impacts will need to be defined more clearly, as addressed in or comments, before we would be able to consider an Adaptive Management Plan for mitigation.

A4-23 Con't In a CEQA document, a project's potential impacts and proposed mitigation measures should be presented in sufficient detail for readers of the CEQA document to evaluate the likelihood that the proposed remedy will reduce impacts to a less than significant level. CEQA requires that mitigation measures for each significant environmental effect be adequate, timely, and resolved by the lead agency. In an adequate CEQA document, mitigation measures must be feasible and fully enforceable through permit conditions, agreements, or other legally binding instruments. Mitigation measures to be identified at some future time are not acceptable, in part because such mitigation measures would be improperly exempted from the process of public and governmental scrutiny which is required under CEQA.

A4-24 We recognize that the Water Board will need to consider issuance of a Water Quality Certification for the proposed project. As such, there is an opportunity to provide information in the DEIR, and to frame proposed CEQA mitigation measures, in a way that supports a future Certification application. In its present form the DEIR lacks a discussion of impacts and proposed mitigation measures at a level of detail sufficient to support the Water Board's consideration of a Certification. Several impacts are not addressed in the DEIR and mitigation measures are either conceptual or inadequate. The Water Board will require mitigation for impacts to wetlands and creek channels. This mitigation must be in the form of creation, restoration, or enhancement of waters of the State. The preferred form of mitigation for impacts to waters of the State is to provide in-kind mitigation on-site, or as close to the impact site as possible. For impacts to wetlands, mitigation should consist of creating, restoring, or enhancing wetlands. For impacts to creek channels, mitigation should consist of creating, restoring, or enhancing creek channels. In order to meet the State's goal of achieving no net loss of waters, creation is the preferred from of mitigation, since it is the form of mitigation that prevents the net loss of acres and linear feet of waters of the State.

Both mitigation measures MM-BIO-8, *Restore riparian habitat*, and MM-BIO-10, *Compensate for loss of wetland habitat,* stipulate the mitigation-to-impact ratio would be 1:1 for temporary impacts and 2:1 for permanent impacts. The basis for these proposed ratios has not been provided, and it is not yet clear that they would be sufficient. The DEIR should be revised to incorporate additional information, as described below.

Please note that the required amount of wetland and creek mitigation will depend on the similarity of the impacted wetlands and creeks to the proposed mitigation project, the uncertainty associated with successful implementation of the mitigation project, and the distance between the site of the impact and the site of the mitigation wetlands and creek projects. In-kind mitigation for the fill of wetlands and creeks consists of the creation of new wetlands and creeks. If the mitigation consists of restoration or enhancement of wetlands and creeks, the amount of mitigation will be greater than if the mitigation consists of wetland or creek creation. If there are uncertainties with respect to the availability of sufficient water to support seasonal wetlands or sufficiently impermeable soils to sustain saturation, then the amount of mitigation would also have to be greater. Finally, the amount of required mitigation increases as the distance between the impact site and the mitigation site increases.

A4-24 Con't

Each proposed mitigation project should also include a monitoring and maintenance plan (MMP) to be implemented to ensure the success of each mitigation project. An adequate MMP should, at least, contain the following minimum components: a summary of maintenance activities, including irrigation, weeding, and replanting of dead or missing vegetation; a schedule for implementing maintenance activities; the plant palette selected for replanting, including pounds per acre of seeds, numbers and sizes of container plants, and sources of all plant material; metrics to be used in assessing successful establishment of vegetation; annual performance criteria, including percent cover, percent survival of plants, species richness, and target plant heights or percent coverage; final success criteria (including formal delineation of mitigation wetlands); and contingency measures to be implemented in the event that annual performance criteria or final success criteria are not attained, or creek channels are not geomorphically stable at the end of the initial monitoring period. MMPs should describe the features (e.g., bank slumping, bank undercutting, rilling, channel avulsion, knickpoints, headcuts, excessive sediment deposition, etc.) that will be used to assess the geomorphic stability of mitigation creek channels. Monitoring should be conducted for a minimum of three to five years for wetland mitigation projects and a minimum of 10 years for creek and riparian mitigation projects.

Finally, we have the following comments for specific mitigation measures (in addition to the comments above for MM-HWR-03, MM-BIO-8 and MM-BIO-10):

A4-25

- We disagree with the DEIR findings that the loss of trees (Impact BIO-5, *Result in disturbance or loss of locally protected trees)* would be mitigated by MM-BIO-12, *Compensate for loss of trees, consistent with applicable tree protection regulations,* because this mitigation measure only addresses requirements of local tree ordinances. This may not compensate for the temporal losses from removing trees that contribute the Creek's functions and values. We recommend the JPA coordinate with the agencies to determine appropriate mitigation for Impact BIO-5 to incorporate into a revised DEIR.

A4-26

- We disagree with the mitigation measures for Impact BIO-6, *Result in effects on steelhead trout and suitable habitat*, because the mitigation measures (MM-BIO-14 through MM-BIO-17) address the potential impacts from construction activities, but do not address the potential effects of the Project design. As presented in comments above, the DEIR should better characterize the Project site, and better describe how the Project design avoids and minimizes impacts, especially by using soil bioengineering methods where practicable. After those elements are characterized better, appropriate compensatory mitigation should be developed. We recommend the JPA coordinate with the agencies to determine appropriate mitigation for Impact BIO-6 to incorporate into a revised DEIR.

A4-27

- As presented above, we disagree with MM-HWR-1, *Prepare an Adaptive Management Plan*. The DEIR should be revised with appropriate mitigation for temporary and permanent changes to waters of the US (intermittent drainage) (i.e., Impact-BIO-4), and comparable impacts to all waters of the State; impacts from

A4-27 Con't accelerated soil erosion or loss of topsoil (Impact-GEO-5); and impacts on water quality (Impact-HWR-3).

A4-28
- Mitigation Measure MM-BIO-11-*Conduct wetland delineation,* is only planned for the Reach 3 detention basins. However, the DEIR states that the existing wetland delineation for the Project was conducted in July 2013. Typically, delineations performed by the Corps are valid for five years, although they may be extended. Permits issued for impacts to waters of the U.S. must be based on valid delineations. Permit applications to the Water Board, and to other agencies, must include a valid delineation of the extent of jurisdictional waters at the project site.

A4-29

8. Alternatives Analysis

The DEIR alternatives analysis has little information on the screening process to reject, or accept, an alternative for further analysis. The DEIR should be revised to include information used to compare alternatives.

In our comment letter on the Notice of Preparation (NOP) (March 10, 2017), we suggested a project alternative to "Maximize Non-Structural Flood Damage Reduction Measures." This alternative is not presented or considered in the DEIR, except for the "floodplain management plan and an early-warning system" in the U.S. Army Corp of Engineers Alternative (Alternative 17). We suggested non-structural alternatives based on Water Board policies for the protection of waters of the state (including the Basin Plan requirements to meet the 404(b)(1) Guidelines), so that the DEIR would consider an Environmentally Superior Alternative. Non-structural flood damage reduction measures could be implemented one property or one neighborhood at a time at the will of property owners (with design support and funding from the JPA). The DEIR should be revised to evaluate these options and how much flood protection could be gained with them. For example, we recommend the DEIR to include flood flow breakout points, areas of flooding, flood depths, and flooding duration. The DEIR should then identify non-structural means to temporarily occupy a single lane in city streets, in parks, and in parking lots, to keep flooding away from structures. These measures could be designed so that they would not block emergency vehicles or keep residents captive in their homes, a concern raised in a recent public meeting.

We are still interested in the DEIR evaluating incremental improvements that a mix of different flood protection measures could provide for protection from up to the 100-year flow event, as mentioned in our NOP comment letter. For example, we had recommended the JPA conduct analyses to determine whether an underground bypass system, combined with non-structural measures, could provide additional flood protection beyond that for the 70-year flow event, or help reduce the need for using soil nail walls in the Creek. We understand the JPA has completed those analyses, and the DEIR should be revised to include them: more-robust description of the JPA's analysis of potentially feasible alternatives to address how improvements for flood protection could be achieved in this Project and as funding, planning, and designs are available over time.

9. Future Water Board Project Authorization -- Least Environmentally Damaging Practicable Alternative

The Project will discharge dredge and fill materials to waters of the United States. As such, it is likely to require authorization from the U.S. Army Corps of Engineers (Corps) pursuant to Clean Water Act (CWA) section 404, and an associated water quality certification and waste discharge requirements (Certification) from the Water Board pursuant to CWA section 401 and applicable sections of the California Water Code. In the absence of a CWA Section 404 permit from the Corps, the Water Board may consider issuance of Waste Discharge Requirements (WDRs) for the Project.

A4-30

As part of the Water Board's consideration of Certification or WDRs, a future application must include an alternatives analysis consistent with U.S. EPA's CWA Section 404(b)(1) Guidelines. The San Francisco Bay Basin Water Quality Control Plan (Basin Plan) incorporates the 404(b)(1) Guidelines by reference. In accordance with the Basin Plan, filling, dredging, excavating, and discharging into a wetland or water of the state is prohibited unless the project meets the least environmentally damaging practicable alternative (LEDPA) standard as determined through the 404(b)(1) alternatives analysis. The analysis will need to identify the LEDPA by evaluating alternatives that, first, avoid impacts; second, minimize impacts; and lastly, compensate for unavoidable impacts.

CEQA includes a review of alternatives that is different from the analysis required under the 404(b)(1) Guidelines. Although the LEDPA analysis is not required by CEQA, a project proponent may tailor the DEIR alternatives analysis to fulfill both the CEQA and 404(b)(1) requirements, which could help expedite the Water Board's consideration of Certification, and minimize the potential need for a supplemental or amended EIR.

9. Miscellaneous Issues

The DEIR should be revised to incorporate the following comments:

A4-31

- DEIR, p. 3.3-58, states: "Santa Clara Valley Water District Guidelines and Standards for Land Use near Streams, Design Guide 5, Temporary Erosion Control Options." This reference is not included in the DEIR references, and we are not familiar with these guidelines. We recommend the JPA incorporate the District's Stream Maintenance Program standard BMPs for impact avoidance and minimization for working in and around creeks and wetlands. In addition, the DEIR should include mitigation measures to prevent the spread of the plant pathogen, *Phytophthora spp*. We recommend the JPA follow the SCVWD's Phytophthora BMPs for construction and revegetation activities. Given the SCVWD is a member agency of the JPA, we would expect the District to provide guidance on the use of the standard BMPs including those for *Phytophthora spp* for all construction and revegetation activities.

A4-32

- The DEIR at pages 3.2-19 and 3.4-19 states that a soil nail wall would be "vegetated." However, the DEIR at p. 2-31 states that significantly more analyses are needed before determining whether vegetation could be planted at the bank toes or on the soil nail walls. The DEIR should be revised to first demonstrate

A4-32 Con't

whether soil biotechnical bank stabilization methods are feasible, followed by analyses for the soil nail walls to incorporate vegetation on the toe rock slope protection and tops of walls.

A4-33

- Mitigation measure MM-BIO-2*, Revegetate disturbed areas with local ecotypes of native plants*, proposes to leave in place gravel or wood mulch used to prevent soil compaction, rather than seeding it with native vegetation. Substituting mulch or gravel for seeding would not mitigate for the impacts to special-status plants (Impact BIO-1), for which MM-BIO-2 is proposed, and thus would not support the preservation of the REC2 beneficial use and, depending on the impacted species, the COLD and WARM beneficial uses.

A4-34

Conclusion

Thank you for the opportunity to comment on the DEIR. As requested above, the DEIR should be revised to better characterize current conditions and potential Project impacts and proposed mitigation. We look forward to working with the JPA on the Project design and would welcome the opportunity to meet with JPA staff to discuss any of our comments.

Please contact Susan Glendening at (510) 622-2462 or Susan.Glendening@Waterboards.ca.gov or Setenay Bozkurt-Frucht at (510) 622-2388 or Setenay.Frucht@Waterboards.ca.gov to discuss our comments or other issues for the Project.

Sincerely,

Keith H. Lichten, Chief
Watershed Management Division

Cc: SFCJPA:
    Len Materman, len@sfcjpa.org
    Tess Byler, TByler@sfcjpa.org
  SCVWD:
    Melanie Richardson, MRichardson@valleywater.org
    Saeid Hosseini, Shosseini@valleywater.org
  CDFW:
    Brenda Blinn, Brenda.Blinn@wildlife.ca.gov
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Corps, San Francisco District:
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U.S. EPA, Region IX, Luisa Valiela, valiela.luisa@epamail.epa.gov

PLANNING & COMMUNITY ENVIRONMENT

CITY OF
PALO
ALTO

250 Hamilton Avenue, 5th Floor
Palo Alto, CA 94301
650.329.2441

Letter A5

June 19, 2019

Len Materman, Executive Director
San Francisquito Creek Joint Powers Authority
615 B Menlo Avenue
Menlo Park, CA 95113
Email: len@sfcjpa.org

RE: San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101 Draft Environmental Impact Report

Thank you for including the City of Palo Alto in the environmental review process for the above-referenced project.

Project Understanding

A5-1 The project is proposed within the San Francisquito Creek watershed within and immediately adjacent to San Francisquito Creek. For the purposes of this Draft EIR, San Francisquito Creek is described in three reaches. The City understands that work proposed in this Draft EIR would be located primarily within Reach 2, which extends from the upstream side of the frontage road to U.S. Highway 101 (West Bayshore Road) to the upstream side of the Pope-Chaucer Bridge. The Channel Widening Alternative, the preferred project identified in this Draft EIR, includes replacement of the Pope-Chaucer Bridge and widening of the Channel Downstream of the bridge, within Reach 2. Under the Channel Widening Alternative, flood protection would be achieved by replacing the Pope-Chaucer Bridge with a bridge that accommodates an increased flow. Downstream of the bridge, flood protection would occur by modifying the channel in areas necessary to accommodate that greater flow, widening the waterway by removing instream concrete structures at five sites and by replacing the University Avenue Bridge Upstream parapet extension. Aquatic habitat restoration would be achieved by adding permanent woody debris, boulders, and/or features to the channel at the widening sites and the Pope-Chaucer Bridge.

The City provides the following comments on the Draft EIR.

Construction Noise

A5-2

1. Page 3.1-16 of the DEIR indicates that channel widening work at sites 1-4 would occur between 8:00 a.m. and 6:00 p.m. Page 3.1-18 of the DEIR indicates that channel widening work at site 5 construction would occur between 7:00 a.m. and 5:00 p.m. However, it appears that work within all or most of the sites at 1, 3, 4 and 5 would occur within the City of Palo Alto's jurisdiction and therefore would be subject to the City of Palo Alto's Municipal Code requirements. The City of Palo Alto Municipal Code restricts construction work to between 8:00 a.m. and 6:00 p.m. Monday through Friday and 9:00 am and 6:00 p.m. on Saturdays. No work may occur on Sundays or holidays. The EIR should reflect the construction hour restrictions consistent with the Municipal Code for work within the City of Palo Alto's jurisdiction.

A5-3

2. The noise chapter indicates that project construction would generate peak noise levels ranging from 80 dBA to 109 dBA at a distance of 25 feet depending on the project component and at various locations throughout Reach 2. Although the City of Palo Alto noise ordinance allows for construction equipment

A5-3 Con't

to generate noise levels of up to 110 dBA at a distance of 25 feet, the City would consider noise levels of this magnitude at sensitive receptors to be significant if they occur on a long-term basis. Specifically, the City considers construction activities resulting in a 10 dB increase in hourly noise levels above ambient conditions to be a temporary and substantial increase in noise levels, provided this increase occurs for two or more hours a day, five days a week, for more than 12 months. A 10 dB increase above existing ambient conditions is typically perceived as a "doubling" of loudness, which in limited doses is not considered substantial. Prolonged exposure to project-specific construction noise levels that are twice as loud as the ambient noise level in which the receiver is accustomed to, however, would be considered substantial, even if such noise levels occur on a temporary basis. This should be discussed in the DEIR. Mitigation measure (MM) NV-3, which was identified in the DEIR, is already anticipated to reduce noise levels by up to 25 dBA. However, the City of Palo Alto recommends that this mitigation measure be refined such that mitigation is implemented proactively to reduce construction noise levels at nearby sensitive receptors, rather than in reaction to neighbor complaints.

Access Ramps

A5-4

3. Page 2-27 "access ramps" describes moving transmission boxes at access ramps 2 and 5 a short distance and relocation of poles and overhead wire at Access ramps 3 and 4. Clarify who owns this infrastructure and where the infrastructure is anticipated to be relocated to.

Permitting

A5-5

4. Please be advised that Architectural Review is required to assess improvements proposed within the City of Palo Alto's jurisdiction. Because significant and unavoidable impacts are identified in this DEIR, it is anticipated that the City of Palo Alto City Council would issue a final decision on the Architectural Review Application.

Traffic and Transportation

A5-6

5. The ADEIR identifies an adequate Traffic Control Plan to mitigate to less than significant levels. As part of mitigation MM-TT-2, signage for bikes and pedestrian detours is proposed.
   - Construction of the bridge should look to minimize duration of the pedestrian detour and look into providing shuttle or other detour assistance due to the distance of the detour.

A5-7

6. The traffic analysis should include an evaluation of the intersections of Middlefield/University and Middlefield/Lytton as they are located on the primary detour route. These intersections operate close to capacity under existing conditions.

A5-8

7. The signal queue at Middlefield/Woodland that could result from implementation of the proposed signal under MM TT-1 should be evaluated to determine how long queues would extend into Palo Alto and if it would affect upstream intersections.

A5-9

8. University/Woodland was not evaluated, and despite not providing detour signage, local traffic assuredly will use this intersection as well as US101 SB/University Avenue signalized intersection.

Hydrology

A5-10

9. On Page 3.8-9, the analysis indicates that the one hundred year flow at Stanford Golf Course is 8,800cfs and downstream at the Palo Alto airport is 9,400 cfs. This stated value between the start and the end seems to imply that the flow increases as you move downstream. However, as shown on Table 3.8-1

A5-10 Con't

there are various constraints in the creek that affect the flow. That should be clarified in the statement on Page 3.8-9.

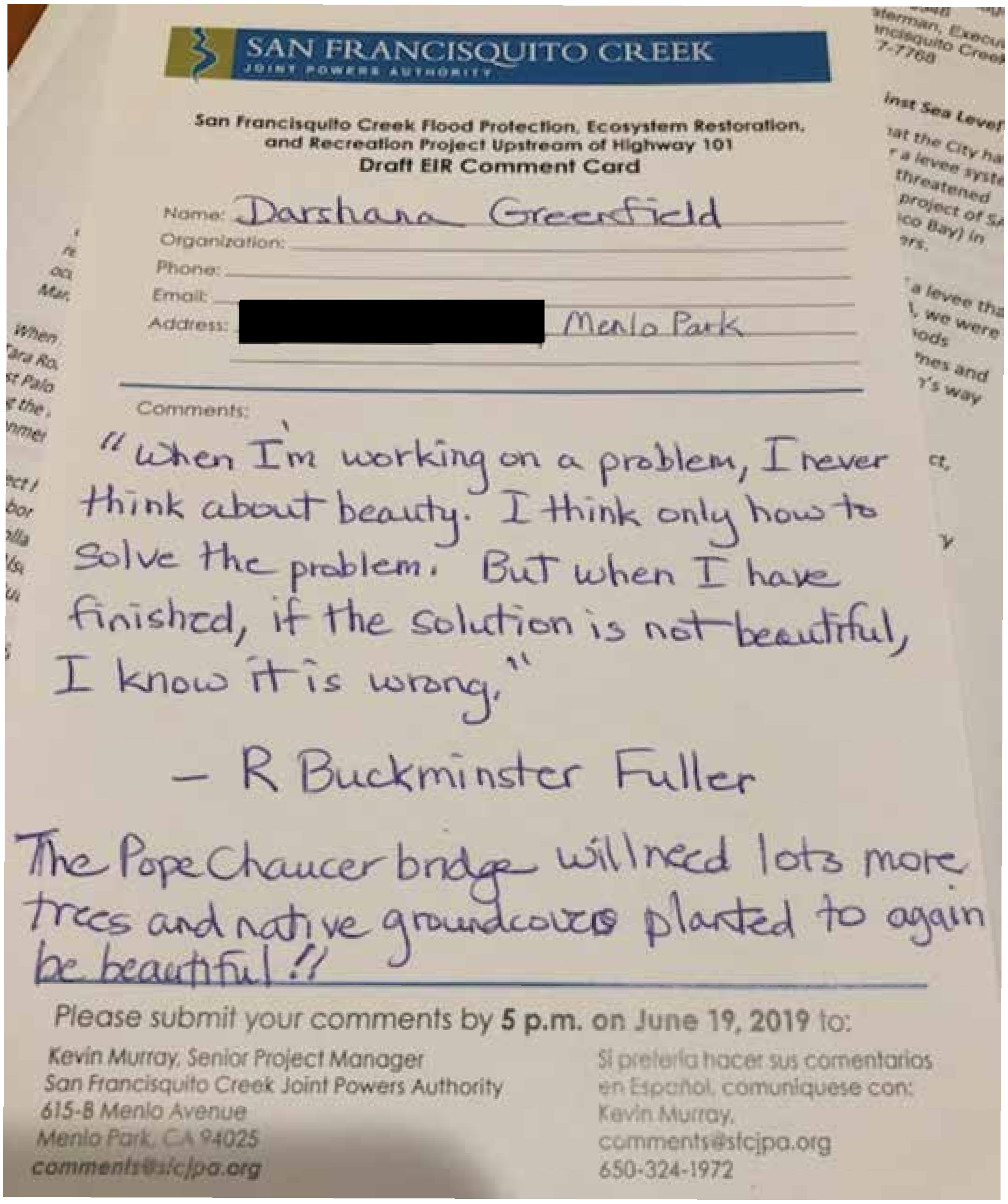
Should you have any questions regarding this letter, please contact me at (650) 329-2116 or via e-mail at Claire.Hodgkins@cityofpaloalto.org.

Sincerely,

Claire Hodgkins, AICP
Planner, City of Palo Alto

Written comments received at public meetings, via e-mail, or postal mail

Letter I1



SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101
Draft EIR Comment Card

Name: Darshana Greenfield
Organization:
Phone:
Email:
Address: [redacted] Menlo Park

Comments:

I1-1

"When I'm working on a problem, I never think about beauty. I think only how to solve the problem. But when I have finished, if the solution is not beautiful, I know it is wrong."

– R Buckminster Fuller

The Pope Chaucer bridge will need lots more trees and native groundcovers planted to again be beautiful!!

Please submit your comments by **5 p.m. on June 19, 2019** to:

Kevin Murray, Senior Project Manager
San Francisquito Creek Joint Powers Authority
615-B Menlo Avenue
Menlo Park, CA 94025
comments@sfcjpa.org

Si prefería hacer sus comentarios en Español, comuníquese con:
Kevin Murray,
comments@sfcjpa.org
650-324-1972

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101
Draft EIR Comment Card

Letter I2

Name: ANN CRICHTON
Organization: Home owner
[redacted]
Palo Alto, CA

Comments:

I2-1 How can I get more information on Bay Flood ~~ES~~ abatement actions/plans. It looks like there is a plan to add sea wall? I'm in a dual impact area Creek + Bay area. Interested in info about Bay flooding.

Please submit your comments by **5 p.m. on June 19, 2019** to:

Kevin Murray, Senior Project Manager
San Francisquito Creek Joint Powers Authority
615-B Menlo Avenue
Menlo Park, CA 94025
comments@sfcjpa.org

Si prefería hacer sus comentarios en Español, comuniquese con:
Kevin Murray,
comments@sfcjpa.org
650-324-1972

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Draft EIR Comment Card

Letter I3

Name: Pat Samuel
Organization: California Trout
Phone: [redacted]
Email:
Address:
San Francisco, CA 94104

Comments:

I3-1 1) The DEIR has no discussion of plans for Searsville Dam, which will determine success or failure of any proposed work downstream. The public must be apprised of the latest discussions with Stanford, permitting agencies, etc. and all major assumptions and decisions so we find compatible solutions.

I3-2 2) Due to incomplete information above, the cumulative impacts section of the DEIR is incomplete, and must be revised.

I3-3 3) There is no alternative looking at utilizing Upper Marsh near Portola Road to reach goal of 1,000 cfs of flood detention, and this is perhaps the best location to attenuate flooding based on topography.

I3-4 4) There is no discussion of sea level rise impacts or future conditions of climate or sediment in the impacts section of the DEIR and so it is deficient in that regard and must be updated and revised with relevant modeling information.

Please submit your comments by **5 p.m. on June 19, 2019** to:

Kevin Murray, Senior Project Manager
San Francisquito Creek Joint Powers Authority
615-B Menlo Avenue
Menlo Park, CA 94025
comments@sfcjpa.org

Si preferia hacer sus comentarios en Español, comuniquese con:
Kevin Murray,
comments@sfcjpa.org
650-324-1972

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Draft EIR Comment Card

Letter I4

Name: Paul Martin
Organization: —
[redacted]
Phone:
Email:
Address:
Palo Alto CA 94301

Comments:

I4-1
Please put back the pedestrian / bike only bridge for Pope-Chaver. We need more bike / pedestrian only bridges.

Please submit your comments by **5 p.m. on June 19, 2019** to:

Kevin Murray, Senior Project Manager
San Francisquito Creek Joint Powers Authority
615-B Menlo Avenue
Menlo Park, CA 94025
comments@sfcjpa.org

Si preferia hacer sus comentarios en Español, comuniquese con:
Kevin Murray,
comments@sfcjpa.org
650-324-1972

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

Letter I5

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Draft EIR Comment Card

Name: Nancy Yamada

Organization: Homeowner/ [redacted]

Phone:

Email:

Address

Palo alto, CA 94303

Comments:

I5-1 I have two live coast oak trees on my property. One is on the creekside of the cinder block wall. Tree provides screening from EPA condos on other side of creek. This tree is not included in current Appendix B of EIR that I can tell. What is its status?

Please submit your comments by **5 p.m. on June 19, 2019** to:

Kevin Murray, Senior Project Manager
San Francisquito Creek Joint Powers Authority
615-B Menlo Avenue
Menlo Park, CA 94025
comments@sfcjpa.org

Si prefería hacer sus comentarios en Español, comuníquese con:
Kevin Murray,
comments@sfcjpa.org
650-324-1972

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

Letter I6

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Draft EIR Comment Card

Name: JOE MCCLUSKEY
Organization:
Phone:
Email:
Address:
[redacted]

Comments:

I6-1 THANKS FOR ALL YOUR PROGRESS SO FAR. I APPRECIATE THE COMPROMISES YOU HAVE MADE.

I6-2 QUESTION: WOULD IT BE POSSIBLE TO USE THE CREEK BED AS A TEMP TRUCK ROUTE DURING BRIDGE DEMO & CONSTRUCTION

Please submit your comments by **5 p.m. on June 19, 2019** to:

Kevin Murray, Senior Project Manager
San Francisquito Creek Joint Powers Authority
615-B Menlo Avenue
Menlo Park, CA 94025
comments@sfcjpa.org

Si prefería hacer sus comentarios en Español, comuníquese con:
Kevin Murray,
comments@sfcjpa.org
650-324-1972

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

Letter I7

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Draft EIR Comment Card

Name: CHANDRA PERMAUL NICOLA

Organization: SECF

Phone: [redacted]

Email:

Address:

EAST PALO ALTO CA 94303-1810

Comments:

I7-1 AS A BICYCLIST WITH TWO SCHOOL AGE CHILDREN I AM CONCERNED THAT WORKING/REMOVING NEWELL AND POPE CHAUCER BRIDGES AT THE SAME TIME WILL MAKE UNIVERSITY + MIDDLEFIELD ROADS LESS SAFE. -> SUGGEST NEW BRIDGES HAVE DEDICATED BIKE LANES ☺

Please submit your comments by **5 p.m. on June 19, 2019** to:

Kevin Murray, Senior Project Manager
San Francisquito Creek Joint Powers Authority
615-B Menlo Avenue
Menlo Park, CA 94025
comments@sfcjpa.org

Si preferia hacer sus comentarios en Español, comuniquese con:
Kevin Murray,
comments@sfcjpa.org
650-324-1972

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Draft EIR Comment Card

Letter I8

Name: Kay Harrison
Organization: Allied Arts Guild
Phone: [redacted]
Email:
Address:
Menlo Park, CA

Comments:

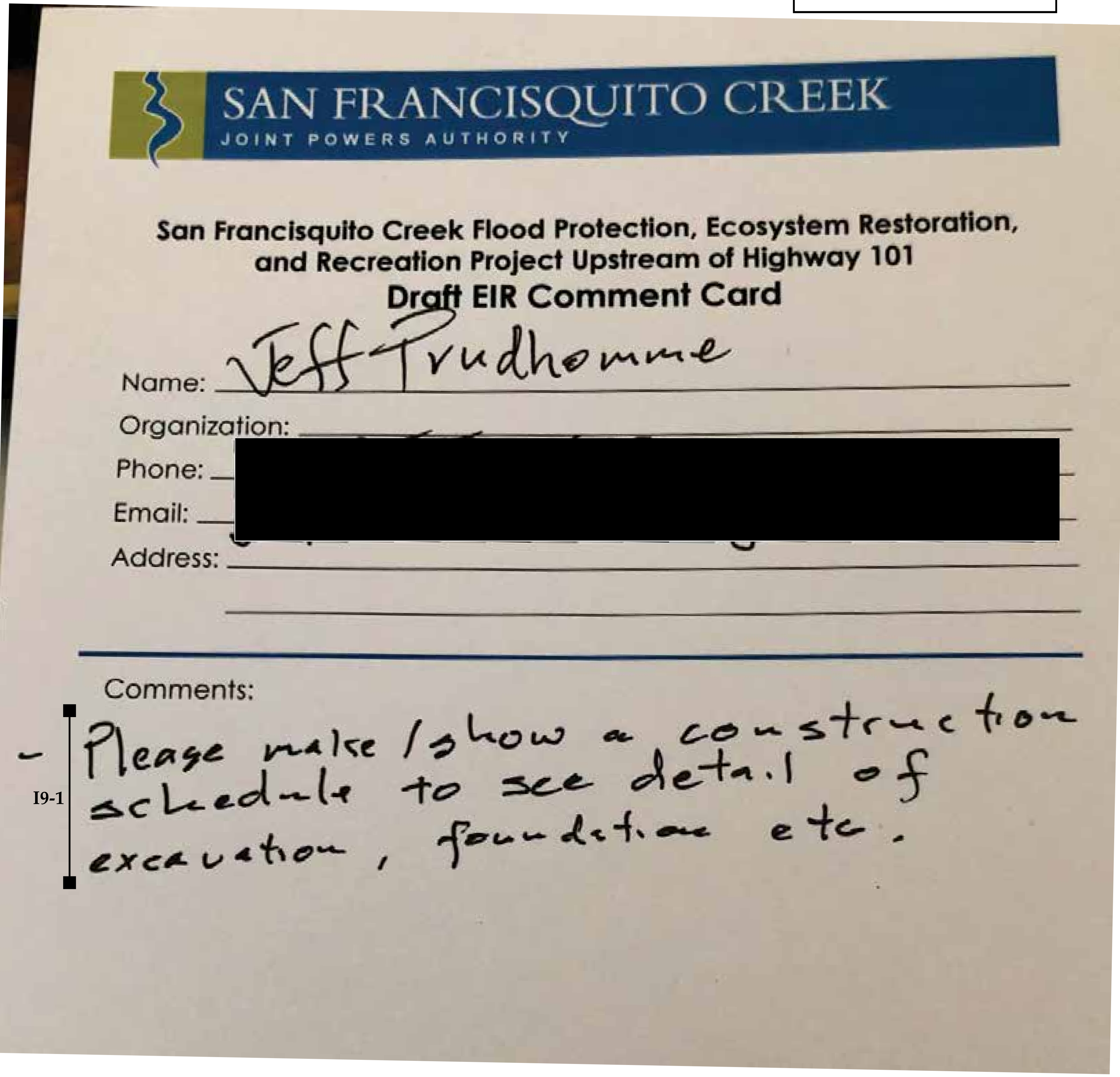
I8-1 Allied Arts Guild Property is concerned about the erosion issues along the creek. We would like to explore having erosion management done.

Please submit your comments by **5 p.m. on June 19, 2019** to:

Kevin Murray, Senior Project Manager
San Francisquito Creek Joint Powers Authority
615-B Menlo Avenue
Menlo Park, CA 94025
comments@sfcjpa.org

Si prefería hacer sus comentarios en Español, comuníquese con:
Kevin Murray,
comments@sfcjpa.org
650-324-1972

Letter I9



SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Draft EIR Comment Card

Name: Jeff Prudhomme

Organization:

[redacted]

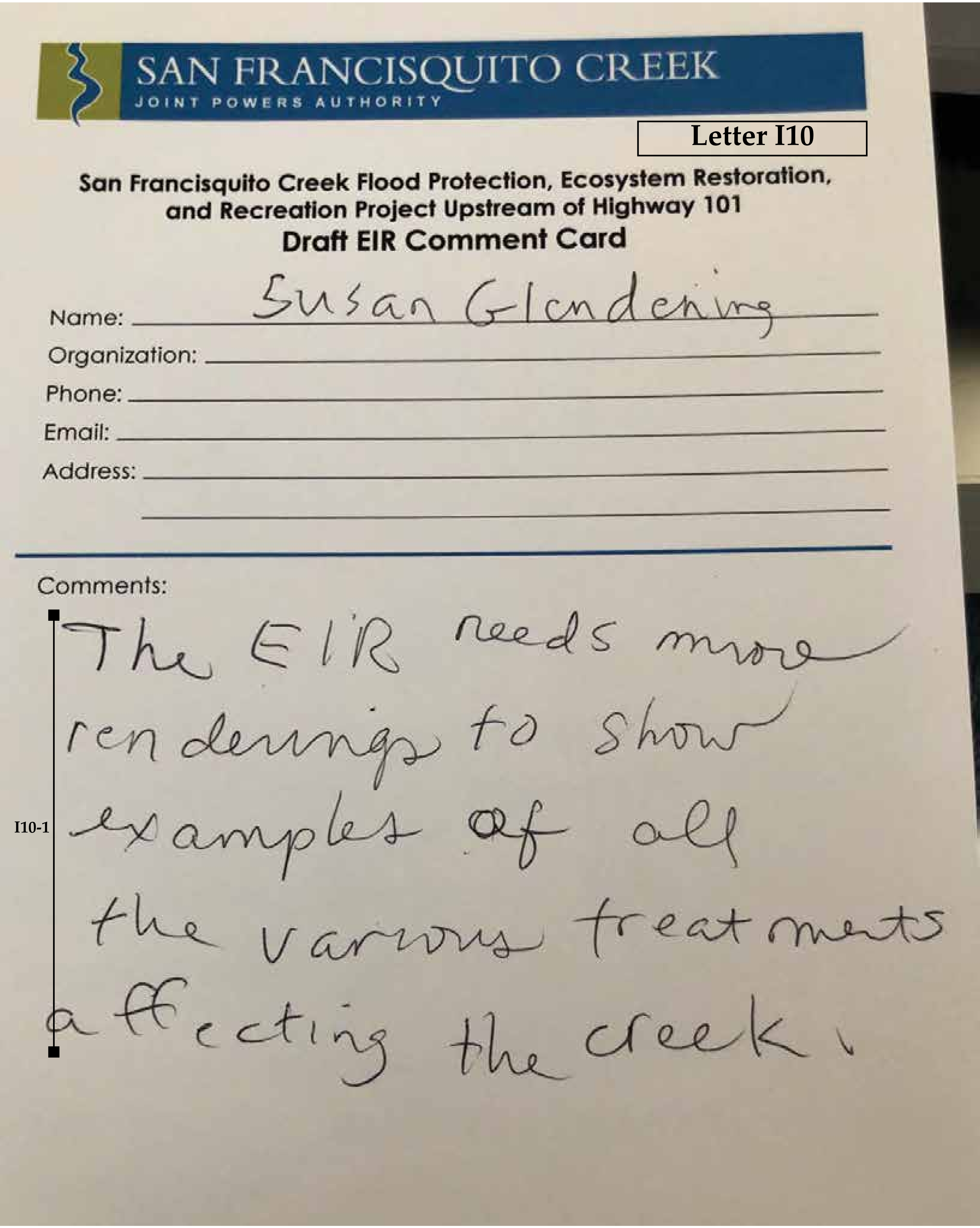
Phone:

Email:

Address:

Comments:

I9-1 - Please make / show a construction schedule to see detail of excavation, foundation etc.



SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

Letter I10

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Draft EIR Comment Card

Name: Susan Glendening

Organization:

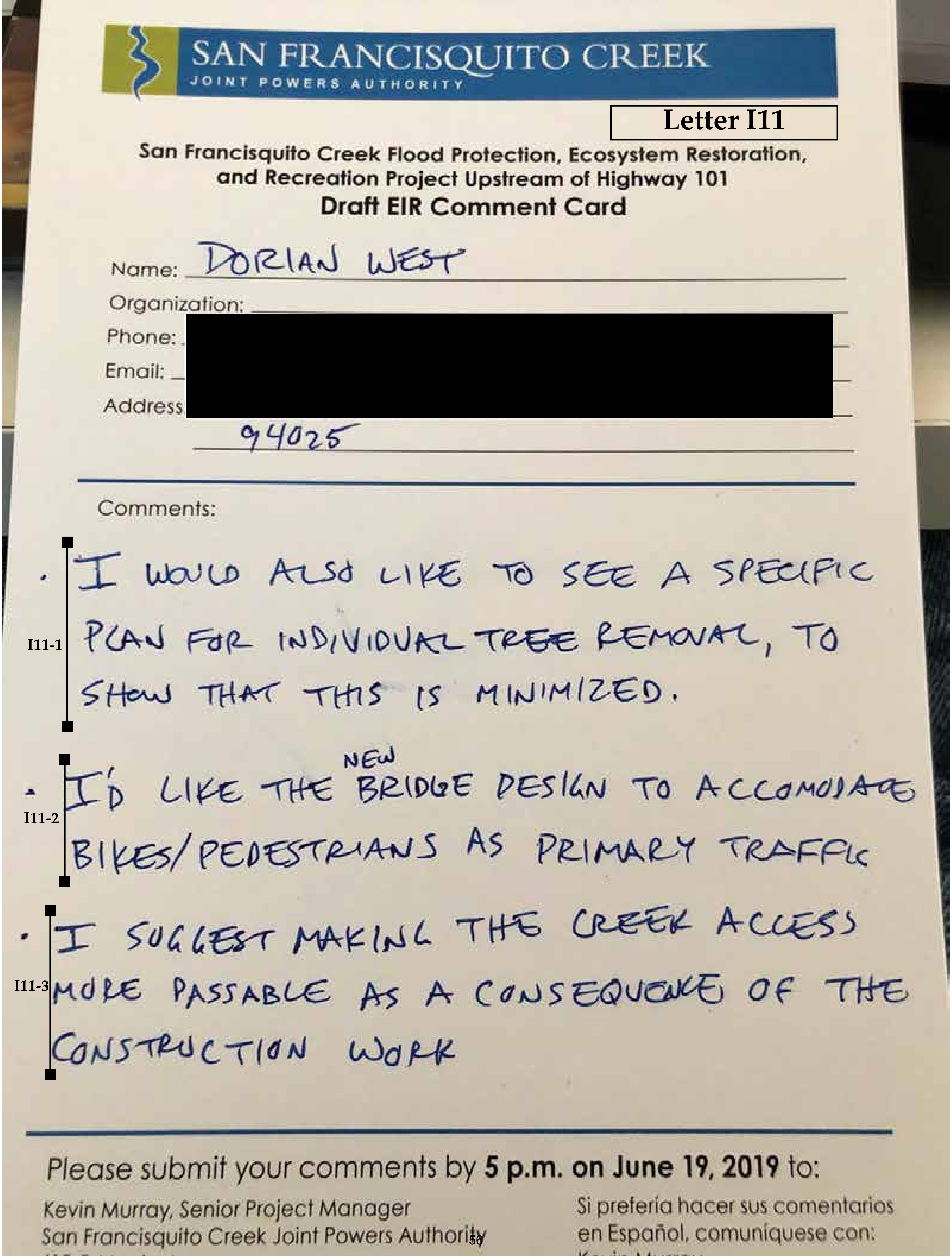
Phone:

Email:

Address:

Comments:

I10-1 The EIR needs more renderings to show examples of all the various treatments affecting the creek.



Letter I11

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Draft EIR Comment Card

Name: DORIAN WEST

Organization:

Phone: [redacted]

Email:

Address

94025

Comments:

I11-1 • I WOULD ALSO LIKE TO SEE A SPECIFIC PLAN FOR INDIVIDUAL TREE REMOVAL, TO SHOW THAT THIS IS MINIMIZED.

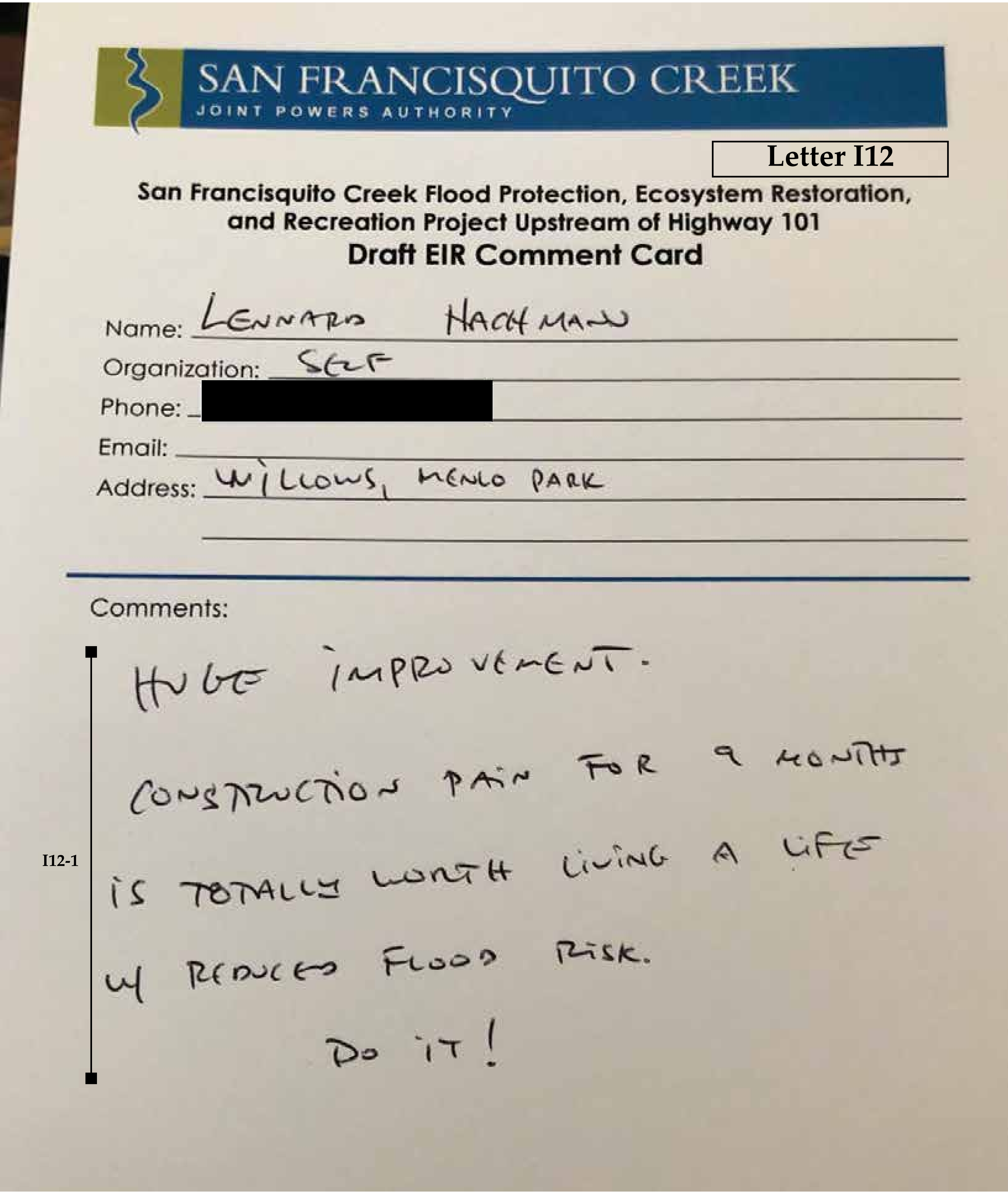
I11-2 • I'D LIKE THE NEW BRIDGE DESIGN TO ACCOMODATE BIKES/PEDESTRIANS AS PRIMARY TRAFFIC

I11-3 • I SUGGEST MAKING THE CREEK ACCESS MORE PASSABLE AS A CONSEQUENCE OF THE CONSTRUCTION WORK

Please submit your comments by **5 p.m. on June 19, 2019** to:

Kevin Murray, Senior Project Manager
San Francisquito Creek Joint Powers Authority

Si prefería hacer sus comentarios en Español, comuníquese con:



SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

Letter I12

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Draft EIR Comment Card

Name: LENNARD HACHMANN

Organization: SELF

Phone: [redacted]

Email:

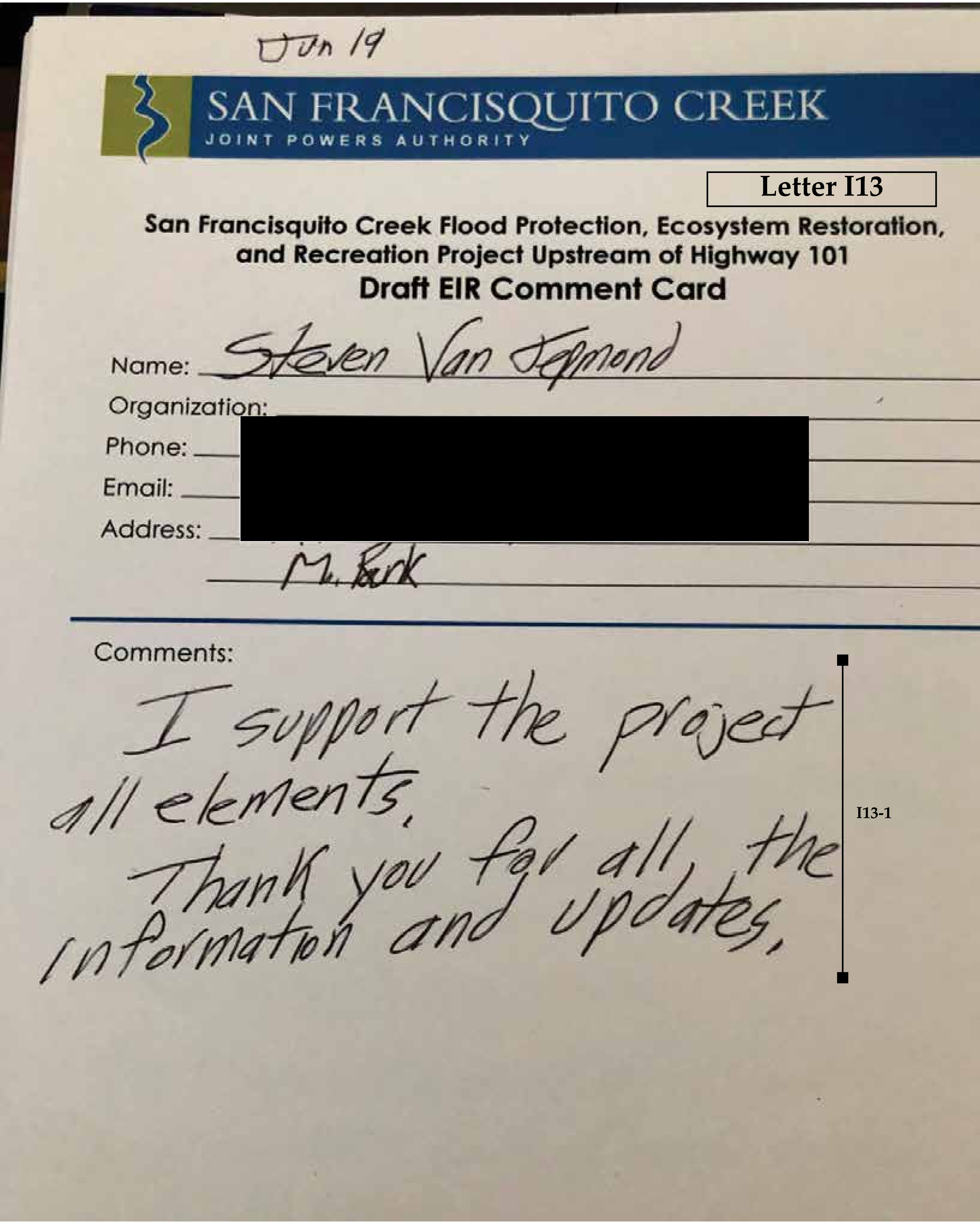
Address: WILLOWS, MENLO PARK

Comments:

I12-1 HUGE IMPROVEMENT.

CONSTRUCTION PAIN FOR 9 MONTHS IS TOTALLY WORTH LIVING A LIFE W/ REDUCED FLOOD RISK.

DO IT!



Jun 19

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

Letter I13

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Draft EIR Comment Card

Name: Steven Van Tegmond

Organization:

Phone:

Email:

Address:

[redacted]

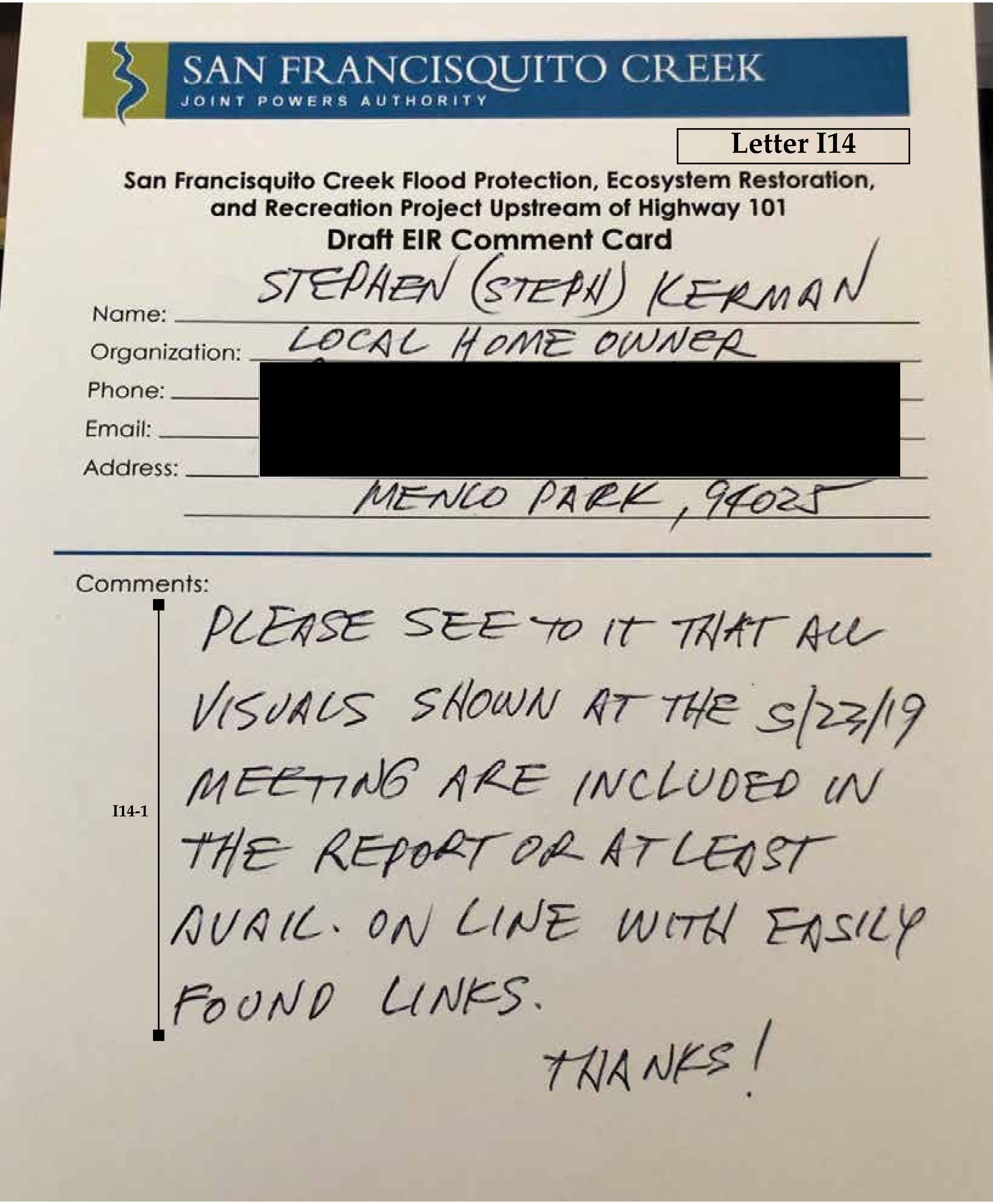
M. Park

Comments:

I support the project all elements.

Thank you for all the information and updates.

I13-1



SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

Letter I14

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Draft EIR Comment Card

Name: STEPHEN (STEPH) KERMAN

Organization: LOCAL HOME OWNER

Phone: [redacted]

Email:

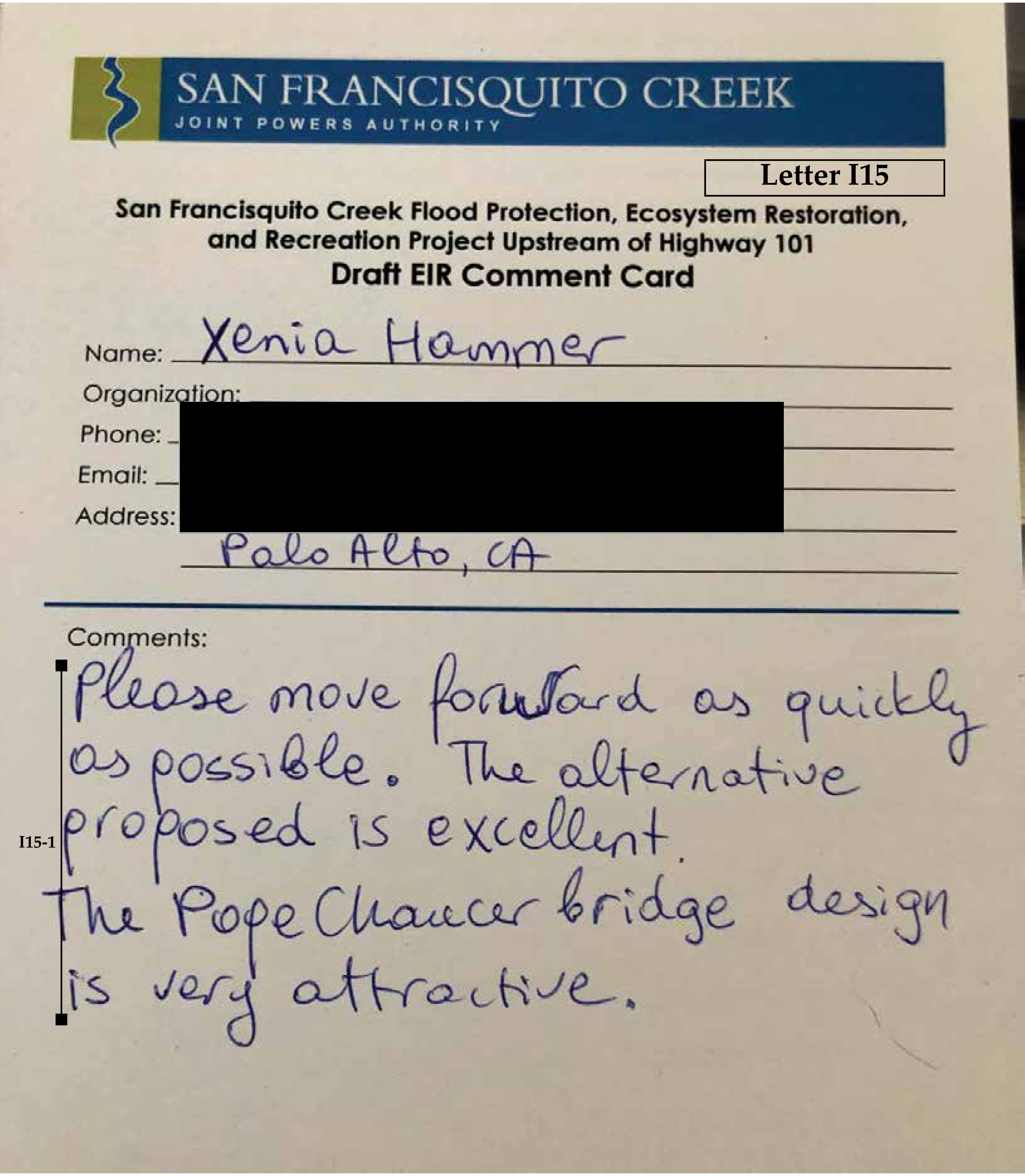
Address:

MENLO PARK, 94025

Comments:

I14-1 PLEASE SEE TO IT THAT ALL VISUALS SHOWN AT THE 5/23/19 MEETING ARE INCLUDED IN THE REPORT OR AT LEAST AVAIL. ON LINE WITH EASILY FOUND LINKS.

THANKS!



SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

Letter I15

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Draft EIR Comment Card

Name: Xenia Hammer

Organization:

Phone:

Email:

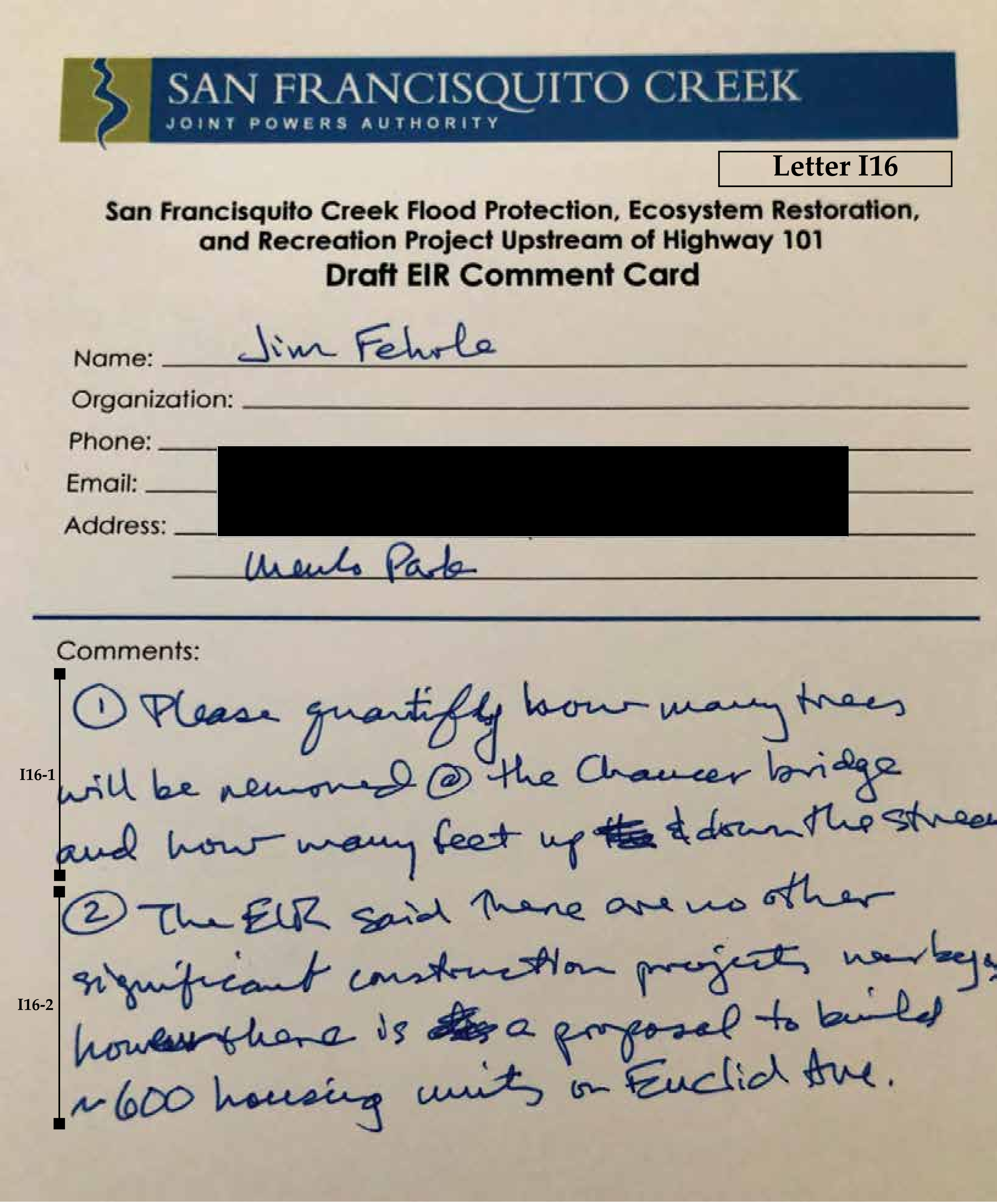
Address:

[redacted]

Palo Alto, CA

Comments:

I15-1 Please move forward as quickly as possible. The alternative proposed is excellent.
The Pope Chaucer bridge design is very attractive.



SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

Letter I16

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Draft EIR Comment Card

Name: Jim Fehrle

Organization:

Phone: [redacted]

Email:

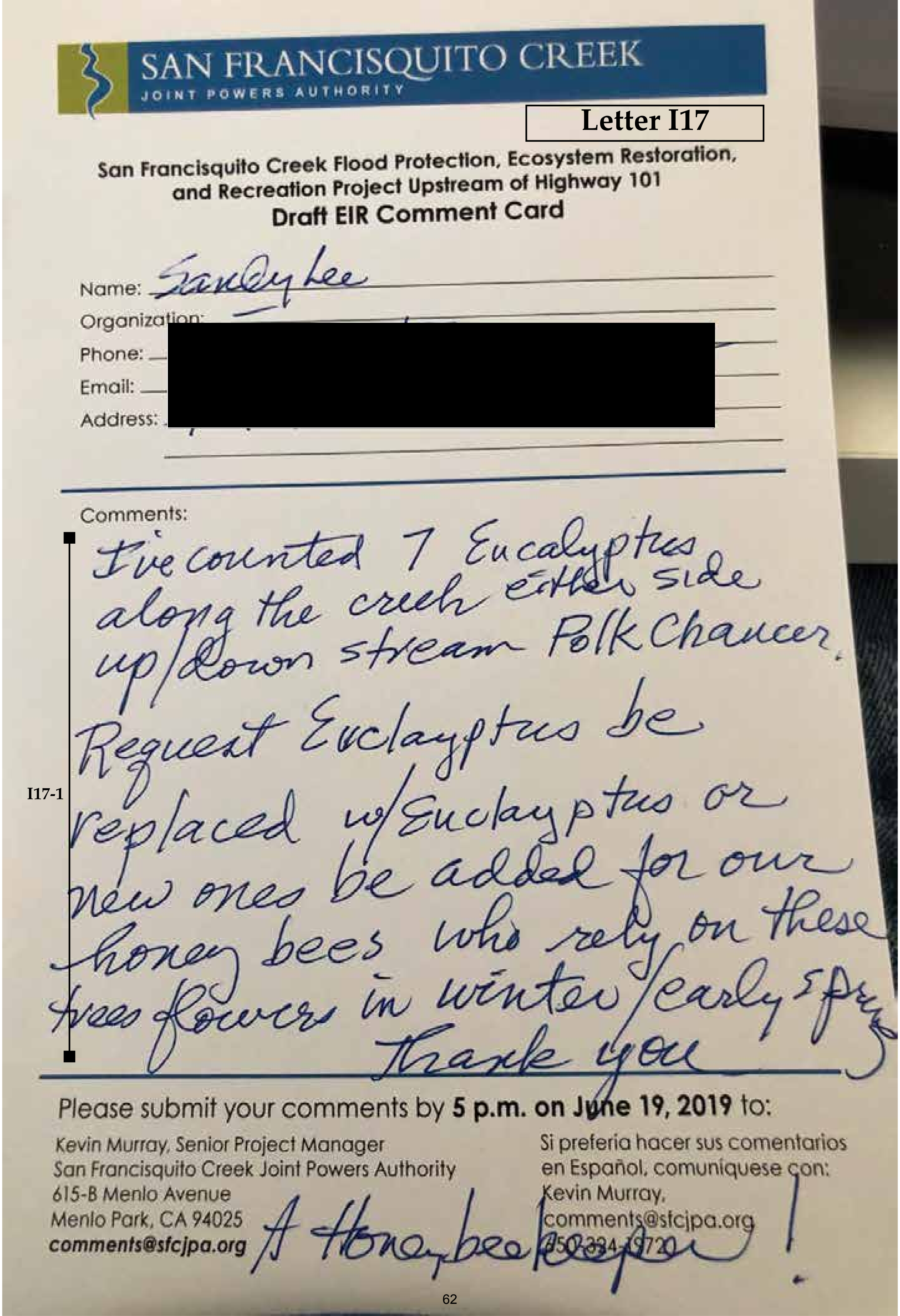
Address:

Menlo Park

Comments:

I16-1 ① Please quantify how many trees will be removed @ the Chaucer bridge and how many feet up ~~[illegible]~~ & down the strea

I16-2 ② The EIR said there are no other significant construction projects nearby however there is ~~[illegible]~~ a proposal to build ~600 housing units on Euclid Ave.



SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

Letter I17

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101
Draft EIR Comment Card

Name: Sandy Lee
Organization:
[redacted]
Phone:
Email:
Address:

Comments:

I17-1 I've counted 7 Eucalyptus along the creek either side up/down stream Polk Chaucer. Request Euclayptus be replaced w/Euclayptus or new ones be added for our honey bees who rely on these trees flowers in winter/early spr

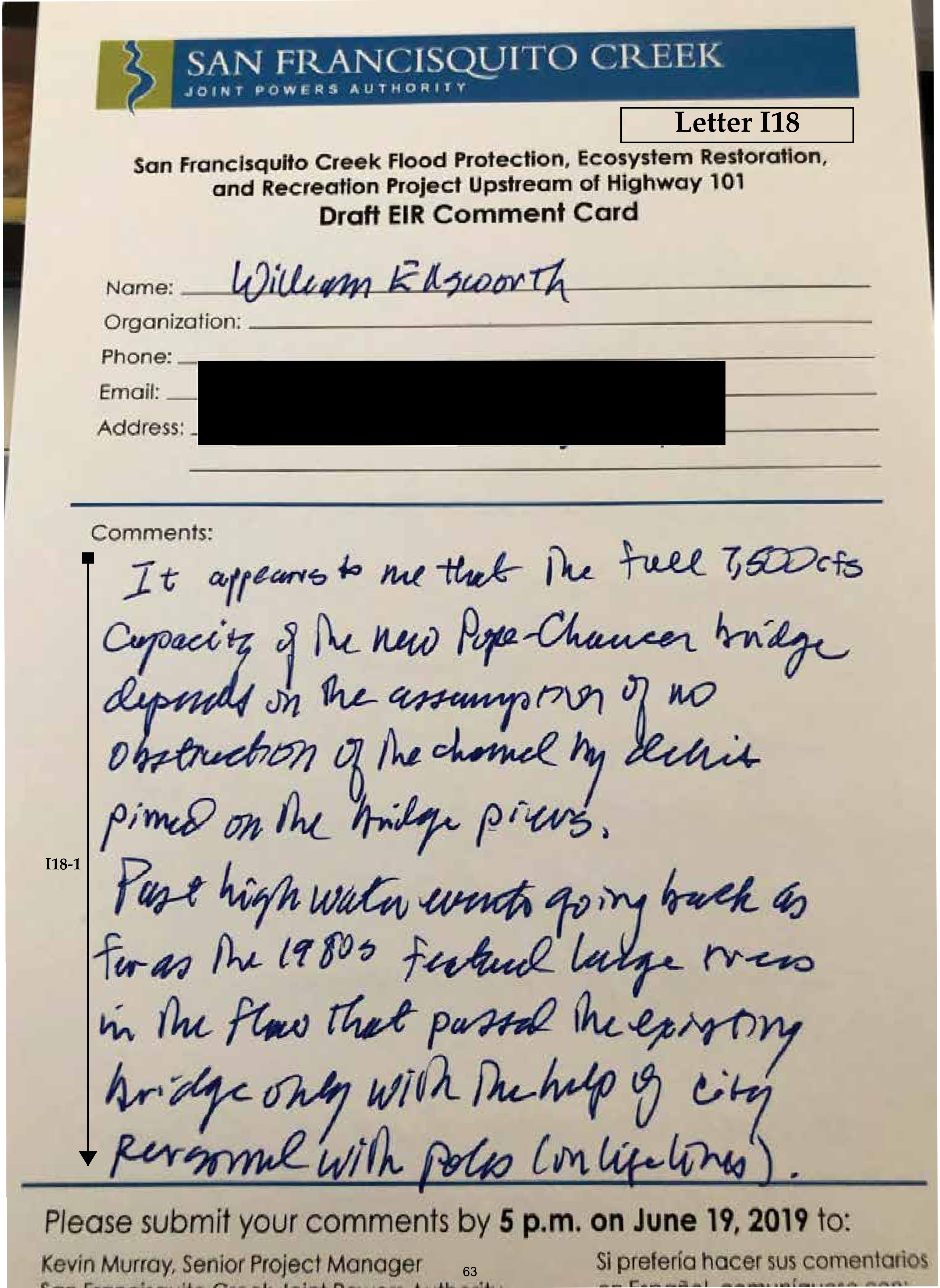
Thank you

Please submit your comments by **5 p.m. on June 19, 2019** to:

Kevin Murray, Senior Project Manager
San Francisquito Creek Joint Powers Authority
615-B Menlo Avenue
Menlo Park, CA 94025
comments@sfcjpa.org

Si preferia hacer sus comentarios en Español, comuníquese con:
Kevin Murray,
comments@sfcjpa.org
650-324-1972

A Honeybeekeeper!



Letter I18

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Draft EIR Comment Card

Name: William Ellsworth

Organization:

Phone: [redacted]

Email:

Address:

Comments:

I18-1 It appears to me that the full 7,500 cfs capacity of the new Pope-Chaucer bridge depends on the assumption of no obstruction of the channel by debris pinned on the bridge piers.

Past high water events going back as far as the 1980s featured large trees in the flow that passed the existing bridge only with the help of city personnel with poles (or lifelines).

Please submit your comments by **5 p.m. on June 19, 2019** to:

Kevin Murray, Senior Project Manager

Si prefería hacer sus comentarios

I18-1 Con't

The design as presented appears to me to have potential to trap trees/debris, restricting flow. How Will the project address the need to account for debris in flood flow? Are there pier designs that would be less likely to trap vegetation in the flow? ⊕ The current Creek bed upstream has many large trees growing in it, which is the natural state. But increases the risk of flooding. It's what the creek would do if left in a natural state – flood & build-up the overbank.

I18-2

⊕ Were alternative designs without piers in the Channel Considered?

Letter I19

-------- Original Message --------
Subject: SFCJPA Project Upstream of Highway 101
From: Meihong Wang [redacted]
Date: Fri, April 26, 2019 8:06 pm
To: comments@sfcjpa.org

Hi there,

I just saw DEIR and looks exciting. Thanks lot for working on this.
I'm wondering what's the implication fo the flooding zone. With 70-year protection done, will some(or majority) of houses in crescent park be moved out of flooding zone by 100-y definition from FEMA? Or we'll have to get 100-y protection done before any houses can be remove from the flooding zone. I19-1

thanks!

Meihong

Letter I20

-------- Original Message --------
Subject: SF Creek Project Upstream 101 Plan concern at 1370 Lincoln PA and 1400 Woodland MP
From: Bruce McCaul [redacted]
Date: Sat, April 27, 2019 1:49 pm
To: comments@sfcjpa.org, [redacted]

Our property spans SF Creek just upstream of Access Ramp 2 as shown in your EIR page 2-17.
The video clip attached shows a concern we have that the retaining wall is being undercut by the creek and the wall is developing a crack at that site.
We do endorse Alternative 2 and hope that as it moves forward the engineers will assess the need for repair of this retaining wall. I20-1
Sincerely,
Bruce and Karen McCaul
[redacted]

Letter I21

-------- Original Message --------
Subject: Comment on San Francisquito Creek Upstream of Highway 101 Draft EIR
From: Naomi Goodman [redacted]
Date: Sun, May 05, 2019 8:58 am
To: "comments@sfcjpa.org" <comments@sfcjpa.org>

I support the plan to replace the Pope-Chaucer Bridge with an at-grade structure with larger flow
capacity, as described in the Draft EIR; however, I would like to see the following comments I21-1
addressed:

*The Draft EIR includes an inventory of trees on privately owned land that would need to be removed
for construction of the Pope-Chaucer Bridge, but does not have a similar inventory of trees on the
creek banks. The EIR states "Streambed vegetation, from 250 feet downstream of the bridge to 250 I21-2
feet upstream, would be removed as needed to accommodate construction equipment." This is a
significant shortcoming, as there is one huge laurel and at least 12 mature oaks growing on the
stream-banks within this stretch. It is not possible to "mitigate" removal of these trees within a
human lifetime. The EIR should identify which trees will be removed, so that residents can judge
whether the cost to the creek habitat is reasonable. In addition, the project should consult with the
volunteer organizations that have been removing invasive vegetation and replacing it with native I21-3
plants within this stretch, so that these efforts are not set back.

* The EIR does not include an inventory of species that may be harmed by "vegetation removal" or
construction. There is a red-shouldered hawk nest in a tree within 500 feet of the bridge. Hawks are
protected by the U.S. Migratory Bird Act. The EIR should specify how impacts on this and other I21-4
protected species will be mitigated.

*The EIR does not specify how the bridge pilings will be protected against collisions with floating
trees. Entire trees can float down the creek during peak flow periods and could take out a I21-5
piling. Diversion structures around the pilings should be part of the bridge design.

*Alternatives that include flood walls along the creek should not be part of the final EIR. Area
residents have made it clear that this option will cause unacceptable damage to the natural creek I21-6
habitat.

*Replacement of the bridge will cause severe traffic impacts on Willows residents that use the Pope-
Chaucer bridge to enter and leave the neighborhood. The only access points to the south will be at I21-7
Woodland and Middlefield. The option proposed in the EIR to install a temporary stop-light on
Middlefield, allowing traffic on Woodland to turn left or right onto Middlefield should be mandatory
for any alternative selected.

Naomi Goodman
[redacted]
Menlo Park, CA 94025

Letter I22

-------- Original Message --------
Subject: creek flooding
From: Larry and April Alton [redacted]
Date: Tue, May 14, 2019 7:19 pm
To: "comments@sfcjpa.org" <comments@sfcjpa.org>

Dear SFCJPA,

Any creek flooding repairs should be paid for by the people that bought and have homes in flood zones, not the general public.

I22-1

Larry Alton
[redacted]

Letter I23

-------- Original Message --------
Subject: San Francisco creek improvements
From: "carole/steve eittreim" [redacted]
Date: Wed, May 15, 2019 8:24 am
To: comments@sfcjpa.org

In our work on the SF creek flood-protection and creek restoration and recreation improvements i would like to put a vote in for maximizing the ecosystem and recreation improvement aspects. This will be the opportunity to open up this semi-wild riparian environment to residents to improve the quality of life in Palo Alto. I realize it is difficult to make changes along the banks of SF creek because along most of its length private properties continue right up to the creek edge. In north Palo Alto, it has been possible to create small park spaces along the creek edge between the road and creek where no houses exist. I do wonder if some sort of tax breaks could be made available by the city to property owners who would allow strips along creek borders to be improved and made accessible to the public. Perhaps even buy up some properties from willing owners?

SF creek is like a linear wild park down the border between MP and PA. Over the 45 years I have lived here, I have occasionally ventured down to the creek bottom and enjoyed its magical environment. Few Palo Altans have done that I suspect but if more did, it would allow more of us to get closer to mother earth, for our better.

I23-1

Steve Eittreim
[redacted]
Palo Alto

Letter I24

-------- Original Message --------
Subject: San Francisquito Creek wall modification
From: Stephen Schooley [redacted]
Date: Sun, May 19, 2019 7:43 am
To: comments@sfcjpa.org

To whom it may concern,
As an design engineer in Silicon Valley myself, any changes that require capital investment need rigorous explanation of assumptions. The changes proposed by JPA are at enormous investment and change that has the community in violent opposition. What would help build confidence in JPA proposals would be to show the assumptions and engineering calculations that prove these changes are required. Please have your engineers prepare that information for public review as there is still a perception that the changes are a boondoggle and thus will be challenged. I look forward to constructively connecting the groups together to find a path forward. I24-1

Sent from my iPhone

Letter I25

-------- Original Message --------
Subject: Public Comment: San Francisquito Creek Upstream of Highway 101 DEIR
From: Hamilton Hitchings [redacted]
Date: Mon, May 20, 2019 9:56 pm
To: "comments@sfcjpa.org" <comments@sfcjpa.org>

Dear JPA,

My neighborhood of Duveneck / St. Francis was flooded during the 1998 flood. I watched Channing Avenue turn into a river and neighborhoods such as De Soto Drive severely flood resulting in many families to move out for many months while their houses were repaired. Since then there have been several instances when the creek almost flooded our neighborhoods again. Our neighborhoods need this project to increase flood protection of the thousands of homes at risk.

This increased flooding risk in San Francisquito Creek is due to the poorly designed Pope Chaucer St. Bridge and the Newell Street Bridges, both of which severely constrict the flow of water underneath them because they filled in part of the creek with concrete underneath the bridges, as well as various other channel man made in-channel constrictions. Thanks to newer construction techniques there is no need for the concrete under the bridges and additional in channel widening in other places of constriction is also possible. These improvements would significantly reduce flooding while modernizing both bridges and enhancing the creek habitat. I25-1

The Preferred Alternative recommended in the DEIR looks like the clear winner. Not only does it substantially increase the flood protection but it also environmentally enhances the habitat of the creek making it more natural. A clear win-win. I also support the identified potential improvements to the upstream Reach 3 on Stanford land although that provides much less flood protection and is within Stanford's control so is rightly treated as an add-on. Hopefully, Stanford will pursue the Searsville dam project.

The DEIR, which I read, was very well thought out, does a good job of mitigating all the impacts and is well presented.

This project as proposed in the DEIR has my full support.

Hamilton Hitchings
[redacted]
Palo Alto, CA 94303

Letter I26

-------- Original Message --------
Subject: Chaucer/Pope Bridge project
From: Linea Stewart [redacted]
Date: Fri, May 24, 2019 4:31 am
To: comments@sfcjpa.org

Looking at the aerial artistic rendering of this project, it looks like several significant trees (bay laurel, eucalyptus, oak) will be removed along Woodland & Palo Alto avenues. Given the current environmental crisis with escalating carbon in the atmosphere, I ask that you not remove these large old trees that are sequestering far more carbon than young replacement trees can. These trees are an important community resource, keeping our air fresh & breathable. Removing them would have an intense environmental impact. In this driven, high stress environment we need their beauty as well. Thank you for considering these important members of our community as you move forward with planning this project. I26-1

Sincerely,
Linéa Stewart
[redacted]
(1/2 block from the bridge)

Letter I27

-------- Original Message --------
Subject: My Comments on Draft EIR
From: Dhruv Khanna [redacted]
Date: Fri, May 24, 2019 12:25 pm
To: "comments@sfcjpa.org" <comments@sfcjpa.org>

[redacted]

Dear Madam/Sir:

I27-1

I write in response to the circulation of the Draft EIR concerning Reach 2 work to reduce the flood risks from the monstrous San Francisquito Creek-Chaucer St. Bridge combo.

The cover letter from Honorable Gary Kremmen and Honorable Len Matterman states that: "Our communities are weary of the threat of flooding each winter, and are concerned that this risk is growing due to climate change. Thus, our primary goal in this effort is to provide a meaningful level of flood protection that can be achieved in the near term and enables additional protection later. In the context of many constraints, we believe our proposed project represents the best way to accomplish that goal and provide other benefits." I write to express my agreement. **I write further to say that I have agreed with this goal since February 1998.**

The Draft EIR states that the proposed project will "increase creek flow at the location of least capacity, the Pope-Chaucer Bridge, by replacing the existing bridge with a new bridge of greater flow capacity, and would increase flow capacity between the new bridge and Reach 1." I support this work. **I write further to state the obvious and do so with unrestrained anger: the entire effort of Reach 1 and Reach 2 has already taken far too long.**

Please get on with it. I say this in ALL CAPS, because I'm fed up with the delay. I'm also sick and tired of environmental activists pushing their own agendas -- e.g. habitat enhancement -- at the expense of causing everyone else more delay, and more money -- and in this case prolonging the duration to which we have been and remain needlessly subject to greater risk of flooding.

And it must be remembered that a part of the enhanced flood risk to which our homes have been subject is squarely the insufficient competence involved in the construction of the Chaucer St. Bridge. That bridge works like a dam during fast, heavy rains --

which has enhanced the flood risk to my home. That bridge was the work of human beings -- under-competent engineers, not beavers.

Every time a project comes up, these environmental folks use the project process to forward their own narrow agenda at the expense of the primary intended potential beneficiaries who deserve a break from enduring -- rainfall after rainfall -- risks of this wretched SFC/Chaucer St. Bridge flooding. **In short, the environmental activists view almost every project as a potential hostage oozing with opportunity to exact some measure -- extravagant or less extravagant -- of ransom.**

The tardiness of the undertaking of Reach 1 and Reach 2 work has been perhaps one of the grandest failings of government and governing (multiple government agencies/entities) at the local level. Here, we can have collective finger-pointing between the local JPA folks, plus the federal agencies such as the US Army Corps of Engineers. Add to that FEMA, and the wildlife agencies and you have an excess of governmental folks all of whom enjoy lavish salaries, pensions and assorted benefits such as health insurance and comfortable work environments all at taxpayers' expense.

I27-1
Con't

In addition to briskly moving forward with Reach 2, I encourage strongly all of the various government folks engaged and many now retired or operating as consultants to engage in some introspection concerning their individual roles in this ultra-slow-moving effort.

I continue to write now solely to accelerate future actions. And to forward that goal it is only befitting to chastise in strongest of terms the tortoise-like pace of the government work here to reduce the risk of flooding such as that we all witnessed in 1998. And please recall, that flood vandalized our homes grotesquely while we were all trying to complete our night's rest.

To end this prolonged disgraceful episode of governmental tyranny-by-incompetence-and-tardiness, **please move forward as soon as legally possible with the Reach 2 work that will "increase creek flow at the location of least capacity, the Pope-Chaucer Bridge, by replacing the existing bridge with a new bridge of greater flow capacity, and . . . increase flow capacity between the new bridge and Reach 1."**

Thank you,

Dhruv Khanna
[redacted] Palo Alto, CA 94303

Letter I28

-------- Original Message --------
Subject: Inconsistency in Draft EIR
From: "Jim Fehrle" [redacted]
Date: Sat, May 25, 2019 8:24 am
To: <comments@sfcjpa.org>

Page 2-21 says "From the upstream face of the bridge, RSP would be about halfway up the bank for approximately 150 feet and then at the toe of the bank for another 100 feet, and from the downstream face of the bridge, RSP would be about halfway up the bank for approximately 125 feet and then at the toe of the bank for another 125 feet."

However, the images on pages 3.1-20 and 3.1-21 look like the RSP goes completely to the top of the bank. Unquestionably right under the bridge and apparently upstream and downstream.

Can you resolve/clarify the apparent inconsistency, either by updating the images or the text?

I28-1

Thanks,

Jim Fehrle
[redacted]
Menlo Park

Letter I29

-------- Original Message --------
Subject: Draft EIR inconsistency?
From: "Jim Fehrle" [redacted]
Date: Sat, May 25, 2019 12:21 am
To: <comments@sfcjpa.org>

Page 2-15/2-16 says “Streambed vegetation, from 250 feet downstream of the bridge to 250 feet upstream, would be removed as needed to accommodate construction equipment."

Figure 2-6 (page 2-20) shows the part of the creek channel that would be used for staging and construction. Looks like about 700' upstream and 150' downstream.

This seems inconsistent, deserving correction or at least clarification.

Jim Fehrle
[redacted]
Menlo Park, CA

I29-1

Letter I30

-------- Original Message --------
Subject: In support of Build Alternative 2 (LPA), Newell Road Bridge
From: Steve Bisset [redacted]
Date: Mon, June 03, 2019 12:51 pm
To: comments@sfcjpa.org

[redacted]

To the SFCJPA,

I am a Palo Alto homeowner, address 1051 Fife Avenue, in the flood zone artificially created by the Pope-Chaucer bridge. Our home sustained minor damage during the 1998 flood. Many of our neighbors fared far worse.

I STRONGLY SUPPORT Build Alternative 2, the Locally-Preferred Alternative (LPA). Please expedite approval of the EIR and completion of this essential project as soon as possible. I30-1

Comments on the alternatives:

No Build Alternative: Unacceptable. Prevents increasing the flow capacity at Pope-Chaucer bridge, leaving future flooding a certainty.

Build Alternative 1: Unacceptable. This alternative is in response to a tiny but vocal minority of Palo Alto residents who seek to use the Newell Road bridge flood mitigation project to create a gated community. The proposed one-lane bridge, where there are now two, will create an unnecessary safety hazard by restricting emergency access. It will do precisely nothing to reduce the legitimate parking issues, which must be dealt with by other means. It will unfairly push additional traffic onto the University Avenue and Embarcadero corridors, burdening a larger set of Palo Alto residents for the benefit of a few. I30-2

Build Alternative 2 (the LPA): Strongly support. This alternative has been well thought out and planned by the SFCJPA and the various other agencies involved. It provides an essential next step in the bay-to-mountains comprehensive approach to flood mitigation, while minimizing the costs. It generates no significant negative impacts (after construction) to nearby PA and EPA residents. It improves traffic safety and especially pedestrian safety, without increasing traffic flow. I30-3

Build Alternatives 3 & 4: Oppose. While these address the flooding I30-4 issue, they introduce an unnecessary encouragement to increased traffic flow across the bridge. This serves a need that does not exist. It also activates opposition from nearby residents, unnecessarily. Such opposition must not be allowed to impede completion of the bridge project, but there is no purpose served by stimulating such opposition. I30-4 Con't

I30-5

I have read the entire Draft EIR. I am familiar with the hydrology models of the creek and the economic issues. I commend the SFCJPA on its thorough work and on its sensible moderate conclusions regarding the future steps for the Pope-Chaucer bridge and upstream retention at the Searsville Dam. I30-6

Sincerely,
Steve Bisset
[redacted]

-------- Original Message --------
Subject: DEIR comments
From: Jerry Hearn [redacted]
Date: Thu, June 06, 2019 8:11 pm
To: comments@sfcjpa.org

Dear Staff,
Attached are my comments to the DEIR. I refrained the other night from presenting them at the public meeting due to their length. I31-1
Thanks for taking them into account.
Jerry

To: San Francisquito Creek Joint Powers Authority
From: Jerry Hearn
Subject: Comments to Reach 2 Draft EIR

I31-2 Thank you for the opportunity to comment on this project. In general I am in support of the proposed preferred project although my comments to follow will address some of the aspects of the project and process that I feel are either lacking or would be improvements.

I31-3 First I would like to focus on the Reach 2 elements of the proposed preferred project.

Pope Chaucer bridge bypass – I have to say that I was disappointed to see this option selected out. I think that it has the distinct potential to have a positive effect on traffic and the neighborhood during the construction phase as well as a lessened long-term impact on the current aesthetics and flora of the area. These approaches have their challenges as to fish passage, but they are not unsurmountable. I feel that there was not enough information provided to support eliminating this potential project from further study. If nothing else, in the replies to this comment I would like to see some of the thinking and information behind this decision.

I31-4 Sediment – this is a big issue for the creek as we all know. I understand how the bridge replacement design interacts with the sediment flows. I looked for, but was not able to find, any information about how the proposed widening sites and bridge replacement would interact with the sediment, both under current conditions and after the annual sediment loads currently

I31-4 Con't being trapped behind Searsville begin to work their way down the creek. Perhaps as the details of the project take more shape this will become apparent. This is critical when it comes to what sort of aquatic habitat will be shaped by the project elements and of great interest to a number of people.

I31-5 Natural bank treatments – Stanford has recently been involved in two projects, one of their own and one in support of San Mateo County, that have incorporated some wonderful natural stabilization elements that, over time, will provide much better aquatic habitat than that generally created by the treatments proposed for these widening projects. One of these in particular, the Lagunita Diversion Dam removal, was faced with the challenge of stabilizing a very steep, high bank with loose soil and on an outside bend of the creek, not dissimilar to those in the areas of the widening projects. The design included features such as root wads, large boulders and native plantings that will provide a much more natural bank for the water and sediments to interact with. Granted, they are more expensive and difficult to design and construct, but San Mateo County and Stanford were both willing to go the extra mile to provide these benefits to the natural habitats. This approach may also prove to alleviate some of the hurdles of the permitting process, as I would expect that at least a few agencies will want to require something more of this nature in contrast to the proposed engineered treatments.

I31-6 Tree Removal – There will need to be a significant number of trees, both native and non-native, that need to be removed for this project. I strongly recommend planting only California native species, better yet watershed native species, and only in

I31-6 Con't

accordance with their natural habitats. If the count of the trees needing to be replaced, a regulatory requirement, exceeds the optimal sites for replacement, then the trees should be planted in other sites within the watershed as close to the project site as possible.

I31-7

My next comments refer to the upstream elements that were studied at a program level, i.e. detention.

Searsville – Stanford has just recently made public some further details about the possibility of using Searsville for peak flow retention. In the references to this the facility, I did not see an update as to their thinking in this area. Maybe I missed that, but, if not perhaps in the final document this could be included. The current update includes the possibility of metering the sediment and water flows as opposed to just allowing the naturally occurring flows through the dam. This option should be included as a potential impact to the downstream project.

I31-8

Former nursery and Webb Ranch sites – While I understand why these two possibilities are included in the DEIR, I am not in favor of pursuing them for a number of reasons:

1. Soil disturbance/removal – we are talking about huge amounts of soil; 1 + and 1.4 million cubic yards of material. These are each in the range of half of the material that would have needed to be removed in a Searsville alternative, and we all felt that the amount of disturbance, both the the natural and human environments, as well as the carbon footprint of doing so, were too impactful to continue to consider.

2.. Stream impacts – at the former nursery site an hydraulic backwater would need to be installed in the stream to direct water into the impound basin which could be a negative impact to aquatic species.

I31-8 Con't 3. Retention amounts – these are limited by the size of the area available and, in a large event, once they are full they provide no more attenuation. Searsville would have a lot more potential capacity

4. Current use impact – it is hard for me to imagine how a farm operation would use a 14-foot-deep hole in the ground for its purposes and getting the right soil inside that basin to allow for farming would be a real challenge, especially if it is to continue to be an organic farming operation.

I31-9 In summary, these seem to be monumental undertakings with huge environmental consequences in order to accommodate two or three large storms in a century. In my opinion, knowing what we know now, financial, social and environmental costs of this approach far outweigh the potential benefits.

Two brief comments as to wording in these sections:

I31-10
- the former nursery site mentions what will be done with the removed soil. The Webb Ranch site does not. I think this should be included to describe the impacts of the project.

I31-11
- In the Webb Ranch project description (last paragraph), I think the wording that was intended was Former Nursery

I31-11 Con't Detention Basin not Former Detention Basin which had me confused for a few moments.

I31-12 Buckeye Creek – a tributary of Los Trancos Creek, which, in turn, is a tributary of San Francisquito Creek that carries somewhere in the range of 20% of the flows in the watershed. Palo Alto has been pursuing a plan on its portion of this creek in Foothills Park to create space for the channel to develop naturally, as opposed to the current channel that is deeply incised due to human activities. This project has the possibility of producing some flow attenuation benefits which, when combined with possible Searsville detention, could prove to be beneficial, especially since it drains a portion of the watershed not controllable by either Searsville or the two proposed detention basin sites. The fact that the 1998 flood had, as one of its contributing factors, a weather cell settling in over Foothills Park and produced more flows than had been anticipated, demonstrates the wisdom of looking for other options to augment the proposed upstream detention in this DEIR.

I31-13 In closing, I am in support of the channel widening approach and, a bit reluctantly, of the Pope Chaucer bridge replacement, as this project will provide a level of flood protection that will get the community through all but the most extreme events for the forseeable future. I feel that the areas I touched on can contribute to an improved project by further enhancement of the ecosystem and avoidance of some activities that are not worth the cost of the negative impacts they would cause. Thank you for your efforts to see this project through to completion.

Jerry Hearn

Letter I32

-------- Original Message --------
Subject: Concerned resident in willows
From: TIFFANY [redacted]
Date: Mon, June 10, 2019 11:24 pm
To: <comments@sfcjpa.org>

Hi. I know you want to redo the bridge and I understand the reason, however; is this project really worth doing, especially for 9 months. Not only your going to ruin mother nature by taking down the Oak Trees. I hope the roots of those oak trees doesn't damage roads and homes by taking the trees out. From the last time the creek was worked on, a couple years ago, to keep it from flooding, I haven't seen any flooding yet. I32-1 You do realize what traffic will be like without the chauser/pope bridge. More traffic/more chaos right. Well, I can imagine traffic being 5 times worse all the way from pagemill/el Camino area to Marsh Road/ el camino area. Is this project really worth doing for 9 months when this can affect major traffic in multiple cities; palo alto, Menlo park, Atherton, East Palo Alto, redwood city? The two bridges/overpass should just take 3 months to redo. The whole creek should take however long and shouldn't affect anyone except a lot of debris from construction. Please please please don't ruin our Willow Community. I32-2

Thankyou for reading!
-Tiffany Souza

Sent from Xfinity Connect Application

Letter I33

-------- Original Message --------
Subject: Draft EIR comments, concerns and questions
From: Larry Rockwell [redacted]
Date: Mon, June 10, 2019 2:30 pm
To: Kevin Murray <comments@sfcjpa.org>, [redacted]

Dear Kevin and Drew:

I was pleased to meet you at the public hearing on May 23. Thanks for taking a couple of minutes to provide some details on the "preferred plan".

First off, I'd like to thank the members of the SFCJPA for all the work done over the past 20 years. I realize how complex the challenge is and applaud the JPA for navigating through the various stakeholders, goals, agendas, and points of view.

My wife and I have been creekside residents for nearly 40 years. Our property is bordered on 2 sides by the Creek. Our property line runs through the middle of the Creek. We've seen the Creek at its most ferocious and have been victim of flooding which affected our property. We lost a lot of bank in the 1980's, forcing us to reinforce much of our bank with concrete sacks. We also had to deal with numerous agencies to get that work permitted. So again, we understand how complex doing anything regarding the Creek is. I33-1

We also love the Creek. Its natural beauty in the midst of Silicon Valley sprawl is unique. This very special resource must be maintained and protected.

Of the Alternatives presented and considered in the Draft EIR, we would have preferred Alternative 1. The rare occasions when the Creek crests do not affect our desire to keep the Creek as it is. But we also understand (or hope?) that the "preferred alternative" will have little - to no - effect on our property or our creekside border. We would also have preferred Alternative 2. Upstream detention would guarantee that our property and all the others downstream would be protected and that our section of the Creek would not materially change. But we've lived around here long enough to know how intransigent Stanford can be. Unfortunately, the JPA is feeling pressure to act (from whom?) and waiting for Stanford could easily delay anything happening for years. I33-2

So that leaves Alternative 3 - replacing the Pope-Chaucer Bridge and widening the Creek downstream from it. So if, in fact, doing nothing and upstream detention are off the table, we have a few comments, concerns, and questions:

1. TREES
Much of the Creek's character is defined by the trees growing in it and along its banks. We understand that numerous trees will be sacrificed to replace the current bridge. We want reassurance that as few trees as possible will be removed and that they will be replaced once the work is finished. I33-3

Further, we'd like to know, specifically, which trees are slated for removal. There is a very large, mature bay laurel just upstream from the Bridge which must be saved, if at all possible. I33-3 Con't

2. CONSTRUCTION NOISE AND TRAFFIC
The proposed construction plan is aggressive. We'd like more specifics about how and when construction vehicles and equipment will be moved in and out of the Creek during the bridge replacement project. What measures will be undertaken to ensure that they do not further snarl already heavy traffic through the Willows? Will they go up Woodland toward Middlefield? Or down Woodland toward University? And during what time(s) of day will they be moving?

Clearly, traffic on Woodland will be increased dramatically. Mention was made that a temporary traffic signal might be installed at the corner of Woodland and Middlefield. Who makes that decision? And who's considering what that would do, not only to traffic on Woodland, but most dramatically on Middlefield, where traffic is already horrendous. I33-4

This issue is a major concern for anyone living near the Creek and on the Menlo Park side. Community outreach to address these concerns should be a priority, as you move forward.

3. CONTINGENCIES
Phase 1 downstream of Highway 101 took considerably longer and cost much more than originally planned. Why is the JPA now confident that this Phase can be completed in 9 months? And if it isn't, are there are contingencies in place to ensure that the project will not be halted, while additional funding is sought.

The proposed timing is confusing. If you expect that the project can be completed in 9 months or less, what happens if it's a wetter than normal year? The plan states that water will be diverted around the construction site. I'm no hydrologist, but anyone who has seen the Creek after a strong storm or series of storms would have to question that whatever "diversion" was put in place would hold up. So that goes back to the previous paragraph - then what? I33-5

I'm sure that you appreciate that this project is going to be a significant inconvenience to local residents. Continued - and personal - outreach to those of us whose lives will be impacted for a year or two deserve to know what's planned, when it will happen, and how long it will take. The Draft EIR is a good starting point, but more needs to be done to keep the residents apprised of what's going on.

Thank you for your attention and concern.

--
Larry Rockwell
[redacted]
Menlo Park, CA 94025

[redacted]

Letter I34

Jeffrey Shore
[redacted]
Palo Alto, CA 94303

June 18, 2019

Kevin Murray
Senior Project Manager
San Francisquito Creek Joint Powers Authority
615-B Menlo Avenue
Menlo Park, California 94025

Via Electronic Mail: comments@sfcjpa.org

Re: COMMENTS ON DRAFT ENVIRONMENTAL IMPACT REPORT – SAN FRANCISQUITO CREEK FLOOD PROTECTION, ECOSYSTEM RESTORATION, AND RECREATION PROJECT UPSTREAM OF HIGHWAY 101 (SCH Number 2013062019) ("**DEIR**")

I34-1

Dear Mr. Murray:

I am a Palo Alto resident whose property abuts the south side of Site 5, which is described in the DEIR as being situated immediately upstream of U.S. Highway 101. Set forth below are comments regarding the above-referenced DEIR:

Comment # 1: Need to clarify inconsistent statements regarding whether the completion of a Reach 3 detention project is assured. If there is uncertainty, need to clarify the nature and sources of uncertainty.

> Discussion: The preferred Reach 2 project ("**Alternative 2**" aka "**Channel Widening Alternative**"), in concert with the Newell Bridge project, is recommended in the DEIR as "achievable in the near term" to protect communities from flows up to the 70-year, 1998-flood event level, which represents the "first phase of work" in pursuit of SFCJPA's programmatic objective to protect people and property from creek flows of at least the 100-year event level.[1] "[P]otential future projects" in Reach 3, which are discussed in the DEIR, are characterized as "complementary" projects that "SFCJPA or others may implement in the future" to increase flood protection to "at least the 100-year event level."[2] As compared to the quoted representations in the immediately preceding sentence, the following statement signals a level of assurance regarding future complementary projects in Reach 3 that is not consistent with the notion of "*potential* future projects" that "SFCJPA or others *may* implement in the future."

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[1] DEIR at 1-2.

[2] *Id.*

I34-1 Con't

> SFCJPA or its partners will supplement a project in Reach 2 with a new facility farther upstream within Reach 3 to detain a high flow before it can cause downstream flooding in Reach 2.[3]

Specifically, in light of the Reach 3 alternatives discussed in the DEIR, the use of the term "will" in the foregoing statement permits the inference that the SFCJPA believes that Stanford will necessarily yield (or be ordered to yield) land for detention purposes.[4]

I34-2

Comment # 2: Need to clarify inconsistent statements regarding whether a sheet pile wall or a soil nail wall would be constructed at Site 5 and discuss the reasons for the type of retaining wall proposed for Site 5.

Discussion: The DEIR has inconsistent descriptions of the channel widening technique that would be deployed at Site 5, immediately upstream of West Bayshore Road. On page 2-4, it is stated that "immediately upstream of West Bayshore Road, either a soil nail or sheet pile wall would replace sacked concrete." However, on page 2-22 (and elsewhere), it is stated that a "sheet pile wall would be constructed" at Site 5.[5]

I34-3

Comment # 3: Need to adequately describe current conditions at Site 5, immediately upstream of West Bayshore Road.

Discussion: The descriptions of Site 5 fail to discuss the existence of a reinforced cinder block floodwall at the top of bank on the Palo Alto side of the creek upstream of Hwy 101 (atop the "warped sacked concrete wall"). The existing cinder block floodwall was constructed by the Santa Clara Valley Water District in 2002. It extends at least 1,000 feet upstream of Hwy 101, well past the apparent reach of the project proposed for Site 5 in the DEIR.[6]

I34-4

The descriptions of Site 5 also fail to acknowledge the existence of trees located on the properties of Palo Alto residences, which trees are rooted within Site 5 and/or

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[3] *Id.* at 1-6.

[4] *Cf.* "Should Stanford University decide not to pursue the project at Searsville by the time SFCJPA implements its project in Reach 2, SFCJPA *may* pursue the implementation of one or more detention basins in other locations on University property." DEIR at 1-6 (emphasis added).)

[5] *See also*, for example, "At Site 5, a sheet pile wall would be built rather than a soil nail wall." DEIR at 2-27; "Sheet piles are proposed for one widening area by West Bayshore Road." *Id.* at 2-31. "At Site 5, a sheet pile wall would be built rather than a soil nail wall." *Id.* at 3.1-18.

[6] *See* San Francisquito Creek Levee Restoration and Floodwall Reconstruction Project. Initial Study and Mitigated Negative Declaration. Public Review Draft. Prepared for San Mateo County Flood Control and Utility Services and the Department of Public Works. Prepared by Thomas Reid Associates, Palo Alto, CA (2002). Available: https://www.cityofpaloalto.org/civicax/filebank/documents/3903 (accessed June 18, 2019). Referenced in the DEIR at 3.5-62. *See* caption on Figure 3.8-1 ("Floodwall in Santa Clara Co. constructed by SCVWD in 2002 extending from Hwy 101 to 1,000 ft upstream from Hwy 101"). *Id.* at 3.8-13.

I34-4 Con't

whose branches overhang, and/or whose roots extend into, Site 5, and which provide natural screening of direct views of the multi-story apartment complex abutting the north side of Site 5 from the vantage points of the single-family residences abutting the south side.[7]

I34-5

Comment # 4: Need to clarify whether the proposed sheet pile wall (or, if applicable, the soil nail wall) would replace or supplement the existing cinder block floodwall within Site 5 (and if so, how) and how the portion of the existing cinder block floodwall beyond the reach of Site 5 would be tied into the proposed wall.

Discussion: On page 2-22, it is stated that, "[a]pproximately 400 linear feet of sacked concrete and bank material would be removed with an excavator. Excavated and removed materials would include approximately 6,111 cy of bank soil and concrete material. The bank would be set back approximately 12 to 21 feet (mean of 15 feet), and to stabilize the bank, a sheet pile wall would be constructed."[8] It is not clear whether and, if so, how the existing floodwall (and its reinforced foundation) adjoining the Site 5 project area would be affected by the excavation and removal of materials. It is also not clear how the proposed sheet pile wall (or soil nail wall) would be tied into any portion of the existing floodwall that would survive the proposed channel widening.

Further, inasmuch as there appears to be less than 12 feet between the top of bank and the back-fence lines of the single-family residences within most of Site 5 (in fact, having as little as 3 feet between the floodwall and the back-fence lines), it is not clear how the construction process, the proposed "set back [of] approximately 12 to 21 feet" and/or the widening of the bank would impact the back-fence lines of the Palo Alto residences directly abutting Site 5, and if so, whether temporarily (during construction) or permanently.

I34-6

Comment # 5: Need to identify, investigate and discuss the impacts of the proposed project at Site 5 associated with the trees in the vicinity of Site 5.

Discussion: Visual and biologic impacts associated with tree pruning, tree removal and tree root disturbance potentially implicated by the Channel Widening Alternative at Site 5 need to take into account, without limitation, the potential impacts on trees from excavation of existing bank materials (including, if applicable, the reinforced foundation of the existing cinder block floodwall) and from construction of a sheet pile wall (or a soil nail wall) at top of bank, including those that provide natural visual screening effects with respect to views of the multi-story apartment complex

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[7] *See id.* at 3.1-10.

[8] *See also*, "At Site 5, the existing sacked concrete and bank material would be removed, the bank would be setback, and a sheet pile wall would be built to widen and stabilize the bank." *Id.* at 3.1-18. "Once built, the widened channel at Site 5 would occupy approximately the same area as the existing creekbed, albeit approximately 15 feet wider (on average)." *Id.* at p.3.1-2.

I34-6 Con't

abutting the north side of Site 5 from the vantage points of the single-family residences abutting the south side of Site 5.[9]

I34-7

Comment # 6: Having failed to adequately describe the existing conditions at Site 5, including trees, tree-screened views of the multi-story apartment complex from single-family residences and the existing reinforced cinder block floodwall at the top of bank on the south side of Site 5, the DEIR did not correctly identify the scope of the potential impacts of the proposed project at Site 5, properly mitigate its impacts or fully inform the public about the project's potential environmental effects. Accordingly, the DEIR should be revised to identify all of the environmental impacts of the proposed project at Site 5 and should be recirculated so that the public has the opportunity to understand and meaningfully comment on the project's environmental effects.[10]

Respectfully,

Jeffrey Shore

email: [redacted]

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[9] *Cf.* Appendix B (San Francisquito Tree Impacts, HortScience/Bartlett Consulting (2018) ("an arborist report that was prepared for the project" omits any reference to the trees on properties abutting Site 5)). *See* DEIR at 3.3-74. "[B]ecause views to the creek itself are largely obstructed by dense vegetation and trees, the widened channel [at Site 5] would be consistent with the existing visual character, and would not substantially alter the visual quality throughout the immediate project area." *Id.* at 3.1-21-22

[10] *See* 14 CCR § 15088.5.

-------- Original Message --------
Subject: Comments on the Draft EIR published April 2019
From: Peter Joshua [redacted]
Date: Tue, June 18, 2019 3:03 pm
To: jpa@sfcjpa.org
Cc: [redacted]

Peter Joshua
Resident Menlo Park

Comments based on the information contained in the EIR and public meetings.

I35-1

1. The use of Detention Basins appears to be the least evasive to the community. Questions on further examination of these options asked at the public meetings met with very limited response.
2. When questioned on the engagement of Stanford and a more comprehensive Searsville Dam option, the answers indicated a lack in depth analysis of this option.
3. The conclusion was that it was Stanford land and the SFCJPA could not or would not pursue this solution more aggressively.
4. It appears from the analysis that the Detention Base solution would have prevented the flood of 1998. Since this was the worst recorded event, this solution should be the primary alternative.

I35-2

5. There appears that the structure and implementation of the Pope Chaucer bridge replacement has not been fully analyzed.
6. A request for information on the work that had been done on analyzing the Pope Chaucer bridge replacement for the purposes of preparing the EIR was answered with "no we will not release that information". Since this is of significant concern to the residents, refusing to provide this information no matter how limited, is alarming.

I35-3

7. I have concerns about the cost of this project, even though these numbers have not been fully disclosed. Our city budgets are under constant stress and services are been cut or eliminated. Therefore the most cost effective solutions should be pursued more aggressively and be the primary alternatives.

Thank you for including these comments in the Draft EIR responses

-------- Original Message --------
Subject: Comments on draft EIR for the SF Creek JPA - replacing Pope Chaucer bridge
From: Carolyn Westgaard [redacted]
Date: Wed, June 19, 2019 2:31 pm
To: "comments@sfcjpa.org" <comments@sfcjpa.org>
Cc: [redacted]

Hello,

I would like to comment on the EIR prepared for the SF Creek JPA. I support the Preferred Local Alternative (channel widening and replacing Pope Chaucer).

I urge you to work diligently and with haste to replace the Newell and the Pope Chaucer bridges so that my neighbors and I are all safer.

I36-1

I live on Saint Francis Drive and my home was flooded by San Francisquito Creek in 1998. At the height of the flood that day, the water was almost four feet deep which profoundly damaged my home and belongings. Many houses in our neighborhood are in jeopardy each winter that passes with the current bridges over San Francisquito in place.

Thank you,
Carolyn Westgaard
[redacted]
Palo Alto

-------- Original Message --------
Subject: San Francisquito Creek Flood Control Projects, Draft EIR/EA
From: [redacted]
Date: Wed, June 19, 2019 4:46 pm
To: comments@sfcjpa.org, Michel.Jeremias@cityofpaloalto.org

To: Michel Jeremias, San Francisquito Creek JPS, City of PA, and all concerned

When San Francisquito Creek flooded in 1998, my older daughter was one of the few children on our street who didn't need therapy or counseling after waking up to a flooded home and neighborhood. She hadn't yet turned two and was still sleeping well off the ground in her crib. When we carried her around more than usual and had her spend a ridiculously long time playing in the (clean) bathtub, she was little enough not to understand the true implications (not so when we had to move out of our house for two months during repairs later on, but that's another story).

What amazes me most today is that my daughter has now graduated from college, but our community still isn't protecting other kids and families from the loss and trauma of such a flood. We all need to work together to get the job done. All of San Francisquito Creek should have capacity for at least 7500 cfs, ideally with further alternatives available based on upstream detection. This is beyond urgent. This should have been dealt with years ago.

The people quibbling over Newell Street Bridge have failed to provide a better comprehensive option than the Draft EIR Build Alternative 2. They've had over twenty years, and there are a multitude of additional options for controlling traffic, if that is some people's real concern. Any person or organization contributing to further delay at this point should be ready to accept responsibility for further damage or trauma caused by another flood. I37-1

As someone who actually lives in a house that flooded throughout every square inch of living space--with many neighbors who still experience flood related anxiety during El Nino years and every major storm--I know that the impact of flooding lasts far beyond financial losses and rebuilding. All of our risks for flooding and other extreme weather events are only increasing with each passing year. We have to bring Newell Street Bridge up to 7500 cfs capacity in order to do the same for Pope-Chaucer. There are good plans available now, including the draft EIR/EA Build Alternative 2. Further delay will only cost us more, both financially and in further trauma, because it's only a matter of time until that creek floods again.

Sincerely,
Susan Mittmann
[redacted]
Palo Alto, CA 94303

-------- Original Message --------
Subject: San Francisquito Creek Flood Control Projects
From: jay whaley [redacted]
Date: Wed, June 19, 2019 7:09 pm
To: "comments@sfcjpa.org" <comments@sfcjpa.org>

Dear Joint Powers Authority,
We have read the details of the published planned project for continuing the upstream efforts to mitigate flooding, such as occurred in our neighborhood in 1998. The proposed plan to replace and widen the Newell Road bridge is very reasonable and totally acceptable. We urge you to move ahead with some urgency to implement the Newell Road bridge replacement, so that the widening of the creek and the replacement of the Chaucer bridge can follow.
Further delays only compounds the likehood of disastrous floods again occurring in our neighborhood. I38-1
Sincerely,
Jay Whaley
Sallie Whaley
[redacted]
Palo Alto

-------- Original Message --------
Subject: Jim Wiley DEIR Comments
From: Jim Wiley [redacted]
Date: Wed, June 19, 2019 5:32 pm
To: comments@sfcjpa.org

RE: San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101 Draft Environmental Impact Report April 2019, the "DEIR"

Four enclosures:
James Wiley DEIR Comments in .docx format
James Wiley DEIR Comments signed scan of same
James Wiley 1200 Woodland Av. Erosion Site - Three illustrations in PowerPoint format
1998-02-10 Massive Erosion newspaper clipping in .jpg format

Note that the erosion repairs on Woodland Avenue referenced by Rubin Nino in the 1998 newspaper report was just upstream from the my home.

Warm regards,

- Jim

I39-1

RE: San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101 Draft Environmental Impact Report April 2019, the "DEIR"

June 19, 2019 by email to comments@sfcjpa.org.

I39-2

My home, 1200 Woodland Avenue in Menlo Park is the "single family home downstream of Pope-Chaucer Bridge that was built between the Woodland Avenue and the creek bank (Figure 3.8-2). This is the only surface structure on the San Mateo County side of the creek that was built on the top of bank between Pope-Chaucer and Highway 101... The banks along this property (sites 1-5 below) [sic] are armored with boulders, concrete and other hard surfaces, so small changes in velocities are not expected to increase erosion potential."[1] My property, which has about ¼ mile of creek frontage, also appears to include erosion site 6. Critically, my property includes the sharpest curves in the creek below the Pope-Chaucer Bridge. The current capacity of the Pope-Chaucer Bridge is protecting my home from more severe erosion. At Erosion Site A in Figure 1, "boulders, concrete and other hard surfaces" were placed on the creek bank after the 1955 flood. They were not an engineered solution. The owner at that time saw a reinforced concrete bank vault being demolished on University Ave. in downtown Palo Alto and offered to let the demolition crew dump the rubble on the creek bank just upstream from my home. We call the rubble "the bank on the bank" There is no toe reinforcement and the toe of the rubble is being undercut already.

Figure 1. Specific erosion sites upstream and downstream of 1200 Woodland Av.

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[1] DEIR PDF Page 406

I39-3 It appears that DEIR does not adequacy address the increased potential for erosion caused by increasing the velocity of flows during flooding events as a result of enlarging the Pope-Chaucer Bridge and increasing the capacity of the creek at downstream chokepoints. It appears that the DEIR under-estimates the increase in velocity that will occur in reaches that are not being widened. In the 1998 flood, the creek water level at Erosion Site A was about 2" to 4" below the top of the creek bank. In the 2012 flood, the water level was about 6" to 12" below the top of the creek bank. In the 1998 flood, just upstream of Erosion Site A, water flowed out of the creek and onto Woodland Ave. through a small culvert located at the intersection of Woodland Ave. and Woodland Ave. Just downstream of Erosion Site B, water flowed out of the creek and onto Woodland Ave. through a small culvert. About 100 yards further downstream, the creek sheet flowed onto Woodland Ave. and then on into the carports below the apartments in East Palo Alto. The point is that the creek was only a few inches from the top of bank upstream and downstream from my home. There is basically zero additional freeboard. To stay in the banks, any additional flow would have to be accommodated by increased flood water velocities. The DEIR proposes to increase creek capacity by 1,800 cfs from 5,700 cfs to a total of 7,500 cfs. To stay below the top of banks in locations that are not widened, the creek flood water velocity at full capacity would have to increase by an average of 1800/5700 about 32%. The DEIR does state that "unimproved erosion areas downstream of Pope-Chaucer Street would experience an increase in velocity and could result in increased erosion beyond existing erosion rates[2]," but it asserts that "The preliminary velocity impacts analysis found that increases would be approximately the same in the channel and on the banks, between 0 and 20%, or about 1 foot per second[3]." It appears that something is wrong with the model calibrations.

I39-4 Since the velocities of maximum flood waters will increase about 32% based on simple math, it is very likely that there will be a very significant risk of bank failure both upstream and downstream of my home. The risk of undercutting and bank failure could be mitigated by engineered toe reinforcements similar to those planned for the proposed soil walls. "To minimize scour at the bottom of the soil nail wall and to prevent future bank instability, bank toe protection would be added at the base of the wall. The toe protection constitutes placing specially sized rocks along the length of the wall and around the corners and embedding them approximately 2 feet into the natural creek bottom. At the face of the wall, it would be approximately 4 feet above the existing creek bottom and would slope downward away from the wall until it conforms with the creek bottom. The top of the toe protection is dictated by the water level for the relatively common 2-year storm event. Figure 2-7. Typical Soil Nail Wall Construction[4]."

Warm regards,

James N. Wiley

James N. Wiley

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[2] DEIR PDF page 338

[3] DEIR PDF page 425

[4] DEIR PDF Page 68


Traffic
More...
Map
Satellite
Earth
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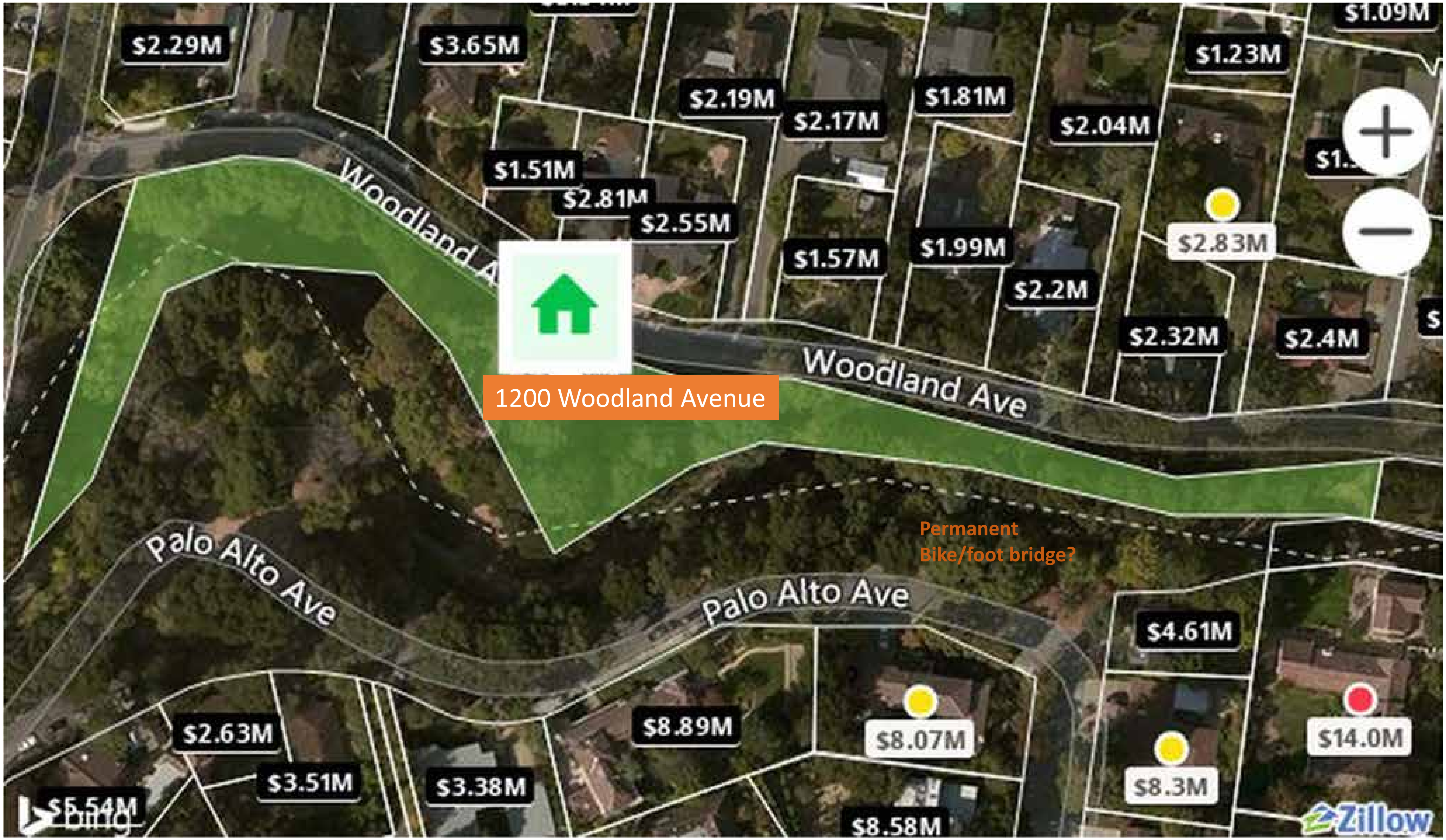
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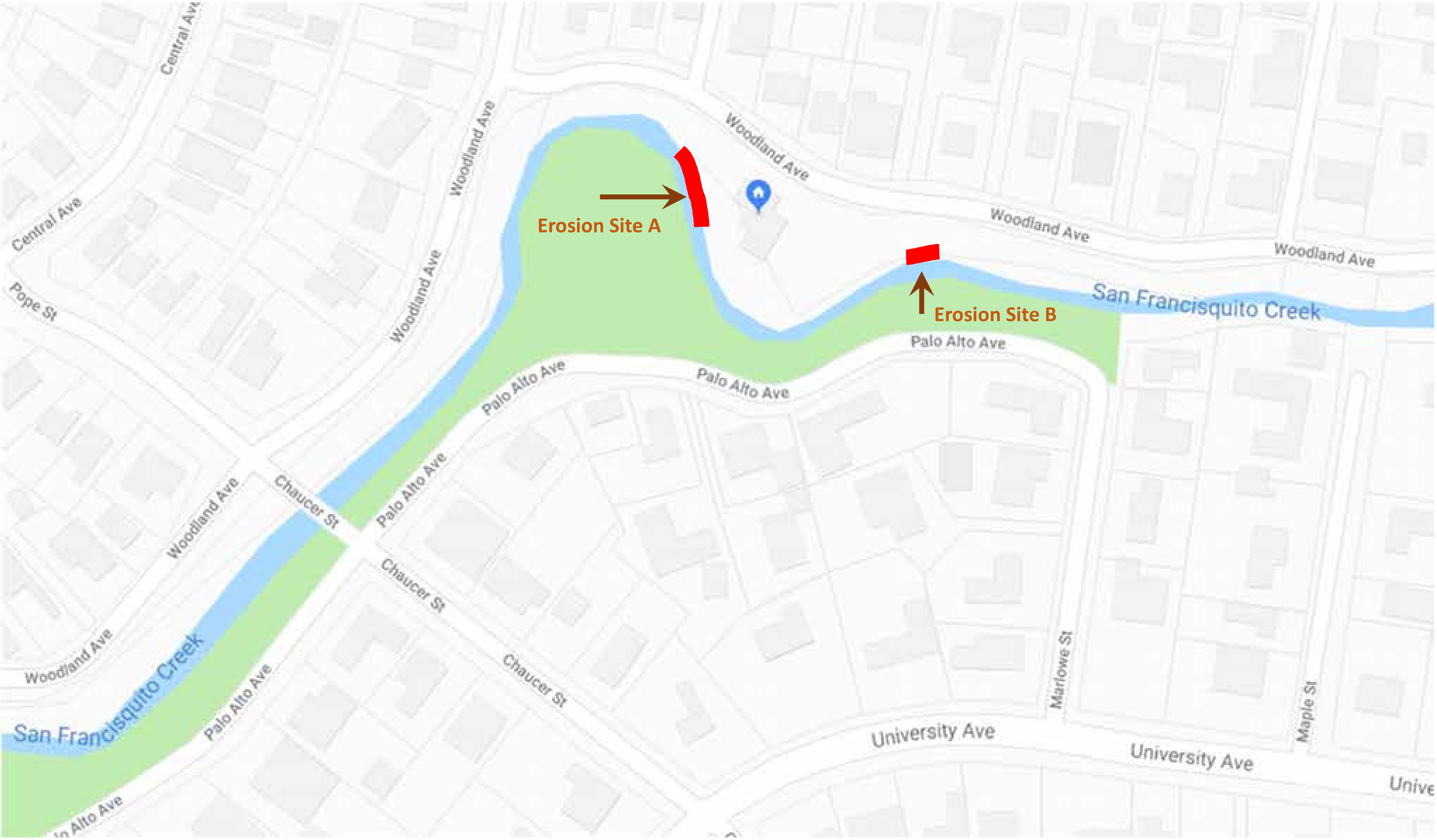
Erosion Site A
Erosion Site B
San Francisquito Creek
San Francisquito Creek
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Pope St
Chaucer St
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Palo Alto Ave
Palo Alto Ave
Palo Alto Ave
Palo Alto Ave
University Ave
University Ave
Marlowe St
Maple St

'Massive erosion' in Menlo neighborhood

BY ELAINE GOODMAN
PALO ALTO DAILY NEWS STAFF

Saturated soil from the relentless rain sent several back yards — including a 30-foot-square wooden deck — sliding into San Francisquito Creek along Bay Laurel Drive in Menlo Park.

The wooden deck at 1855 Bay Laurel Drive plunged into the creek over the weekend, after rain soaked the ground nearly nonstop for days, according to Acting Chief Charlie Fasso of the Menlo Park Fire Protection District. At least seven other homes on Bay Laurel Drive and Oak Avenue saw big chunks of yard slip away, Fasso said.

"I think if we get more heavy rains, we're going to lose some more property," Fasso said.

Because the homes along Bay Laurel Drive are private property, it's up to homeowners to stabilize the creek banks, according to Ruben Nino, Menlo Park's engineering services director. Some homeowners have placed tarps over their yards to control the erosion, Nino said.

Menlo Park has been shoring up creek banks on public land, such as along Woodland Avenue, by dropping boulders into the creek.

Shed in peril

East of Bay Laurel Drive, at the end of Arbor Road, the Wick Candle Shop at the Allied Arts Guild lost a tree, a 7-foot fence and came close to losing a merchandise storage shed. The shed was emptied and will be torn down come spring, according to shop owner Jim Hill.

The candle shop wasn't damaged and is still open for business, Hill said.

On Stanford-owned land on the south side of the creek, raging waters swept away a 12-foot-long by 6-foot-wide strip of land behind the Children's Health Council, according to Executive Director Molly Polidoroff. A 10-foot tall fence that was threatened by erosion was taken down, but a few fence posts and their concrete bases fell into the creek, Polidoroff said.

"The erosion was just massive," said Charles Brandon, who lives across the creek from the health council. "You could see the sprinkler pipes just sticking out into the air."

Tree ripped out

On other Stanford land, several trees have been removed that were leaning precariously into the creek, according to Community Relations Director Andy Coe.

In Palo Alto, a huge tree tipped over, tearing away the ground beneath Palo Alto Avenue at Webster Street, according to Public Works Director Glenn Roberts.

"It was ripped away by the weight of the tree turning over," Roberts said.

The intersection is barricaded and the city will take prompt action to stabilize the ground, Roberts said.

-------- Original Message --------
Subject: San Francisquito Creek Joint Powers Authority DEIR flood control project
From: Jack Lucas [redacted]
Date: Tue, June 18, 2019 12:35 pm
To: comments@sfcjpa.org

Joint Powers Authority for San Francisquito Creek,

In regards the draft environmental impact report for proposed flood control action on San Francisquito Creek it would seem important to review recent erosion and tree loss in Reach 3 between #280 and Arastradero Road.

This stretch of Los Trancos Creek channel appeared to have weathered highest flows in 1998 storm event well and yet in winter of two years ago, backflow not only undermined junction of Arastradero and Alpine Roads but the riparian corridor collapsed on itself as stream accentuated its meander into Alpine Road at Ladera. At least this is what appeared to have happened from roadways, but did not walk creek channel as it was cordoned off. I40-1

As this portion of Reach 3 between Arastradero Road and #280 is critical to remain in its historic meander and stability, as roadways give no room for adjustment at either end, it is essential to analyze what has gone wrong or changed here in hydrology of Los Trancos Creek. This is of special concern in consideration of a detention basin diversion at the former Boething plant nursery site.

Since 1998 Stanford U. has made modifications to the fish ladder at Arastradero Road and increased amount of flow diverted to Felt Lake. Believe change in these elements may have affected flow meander and resiliency of tree roots to withstand pulse stream surges in channel. This may have already been analyzed by staff, but if so, it needs to be included in this DEIR along with recommendations for adjustment or change In regimen. I40-2

An integral aspect of Los Trancos Creek diversions, besides supply of water for campus irrigation, is to support wetlands habitat for San Francisquito Creek watershed's endangered species such as the Tiger Salamander. In recent weeks have had no luck in ascertaining current status of Tiger Salamander colony at Lake Lagunita as to numbers of adults and juveniles and as to general health of this indicator species. Think this needs to be included in DEIR in evaluating integrity of fish ladder diversion and Stanford pump station located downstream. I40-3

Know this comment does not begin to do justice to enormity of challenge faced in alterations in riparian canopy and channels throughout San Francisquito Creek's watershed but had to focus on Los Trancos Creek concern.

Thank you for consideration of these elements.

Libby Lucas
[redacted] Los Altos, CA 94022

Letter I41

-------- Original Message --------
Subject: SFC Upstream of Hwy 101 Draft EIR
From: Ben Ball [redacted]
Date: Thu, June 13, 2019 12:14 pm
To: "comments@sfcjpa.org" <comments@sfcjpa.org>
Cc: "len@sfcjpa.org" <len@sfcjpa.org>, Ben Ball
[redacted]

SJC JPA,

I was out of the country at the end of May and early June so was unable to attend any of the three meetings on the Draft EIR. I've read through some of the document but not all of the 888 pages. I was hoping that someone could answer a few of my questions below. For reference my primary residence is 1425 Edgewood Dr. in Palo Alto and I own the property at 1491 Edgewood Dr. in Palo Alto. I've my visual interpretation of the maps is correct my primary residence would be impacted under "site 3" of the Draft EIR and my second property would be impacted by "site 4". I41-1

- Page 2-22 states, "At Site 3 (Figure2-4), approximately 456 linear feet of existing sacked concrete and bank material along the Palo Alto Bank would be removed with an excavator. Excavated and removed materials would include approximately 2,806 cy of bank soil and 508 cy of sacked concrete (totaling 3,314 cy).The bank would be set back approximately 4 to 24 feet (mean of 9 feet), and to stabilize the bank, an architecturally treated soil nail wall would be constructed." I41-2
  - What does it mean that the bank would be set back 4-24 feet?
  - Is this measurement from the current top of the bank or from the current bottom of the bank? 24 feet from the top of the bank would create significant damage to my property.
  - Was any consideration given to widening the bank on the EPA side of the creek where there are no homes impacted?
- Page 2-22 also states, "At Site 4 (Figure 2-4), approximately 160 linear feet of existing sacked concrete and bank material along the Palo Alto Bank would be removed with an excavator. Excavated and removed materials would include approximately 478 cy of bank soil and 122 cy of sacked concrete material (totaling600cy). The bank would be set back approximately 4 to 18 feet (mean of 9 feet),and to stabilize the bank, an architecturally treated soil nail wall would be constructed." I41-3
  - What does it mean that the bank would be set back 4-24 feet?
  - Is this measurement from the current top of the bank or from the current bottom of the bank? 18 feet from the top of the bank would create significant damage to my property and would imply removing several large trees.
  - Was any consideration given to widening the bank on the EPA side of the creek where there are no homes impacted?
- The report states that at access ramp 4 there will be a Creekside park created (#2). I41-4
  - The apartments in EPA already have a car parking deficit and could benefit from having four spaces in this location to park cars. Was such an option considered?
  - I regularly hear gunshots coming from the EPA side of the creek so the thought of having a small park for people to loiter at night creates fears of more potential gunshots. I couldn't find in the report the "net value" created by this park but from my perspective this is a terrible idea.

Will there be any more public meetings on this topic or is this it? Also, were materials presented during these meetings and is there a way for me to see them? I41-5

I look forward to your feedback.

Ben Ball
[redacted]

-------- Original Message --------
Subject: Re: comments on San Francisquito Creek Upstream DEIR
From: Jeff Prudhomme [redacted]
Date: Tue, June 11, 2019 6:24 pm
To: comments@sfcjpa.org

Dear sfcjpa,

As i understand it from the deir, the plan is to enter and exit the creek across from 935 Woodland Ave. This is not acceptable to us living at that residence for the following reasons:

1. When the original bridge was put in the three current homes built in the 50's in that location were not in existence. Now our driveway is directly across your planned location where the street is very narrow, approximately 16ft total width. It would be an undo and unnecessary hardship for us having all the trucks enter and exit at our driveway, and to be exposed to the the continuous truck activity at our house.
2. The location must be moved regardless of your original cost assessment to a proper location that does not interfere with a residence's access to their home. One suggestion would be to locate the ramp at an intersection,such as Laurel and Woodland. I42-1
3. Where ever it is located, the cut out needs to be managed to not result in a lowering of the elevation of the creek bank in any way that could cause specific flooding due to the ramp.
4. Secondly, the area at the ramp must be landscaped to discourage pedestrian and auto traffic. Is must be landscaped to hide the effects of the ramp and match the creek setting landscaping. The landscaping plans must be shown for approval to the residents effected. I42-2
5. Lastly, the trees to be removed should be done carefully and for important reasons. The trees planned to be removed along the creek bank should be mapped and identified so the residents can easily identify them. This should be a review process. I42-3

I would like to get a formal response from sfcjpa regarding these comments so i can know how to proceed on these important issues for my family.

Thank you,

Jeff Prudhomme
[redacted]
Menlo Park
[redacted]

Sent from my iPhone

On Jun 5, 2019, at 10:09 AM, <comments@sfcjpa.org> <comments@sfcjpa.org> wrote:

> Thank you for submitting a comment on the Draft EIR for the SFCJPA's Upstream of Highway 101 project. We will take your comment into account as we develop the Final EIR this summer, and will respond to it within the document. Please continue to follow the progress of this project on our website, sfcjpa.org, and feel free to contact us if you have any questions.
>
> Sincerely,
>
> San Francisquito Creek Joint Powers Authority
> 615-B Menlo Ave
> Menlo Park, CA 94025
> (650) 329-1987

Letter I43

-------- Original Message --------
Subject: Re: Comments to San Francisquito Creek Joint Powers Authority Draft EIR
From: Kay Harrison [redacted]
Date: Tue, June 18, 2019 9:40 am
To: [redacted]
Cc: "comments@sfcjpa.org" <comments@sfcjpa.org>, [redacted]

I43-1

Hi Nancy,

Thanks so much for sending this.

This, along with the comment form we filled out at the meeting we attended, should spark some discussion.

May I forward this to the Board?

Kay

> On Jun 18, 2019, at 9:28 AM, Nnn Lll <nanides@sbcglobal.net> wrote:
>
> Allied Arts Guild is located in 75 Arbor Road, Menlo Park and its property is adjacent to the San Francisquito Creek. The Draft EIR shows AAG in Reach 3 and while we understand that the report doesn't address the erosion issues, we want to take this opportunity to bring out our concerns of bank erosion on San Francisquito Creek.
>
> In June 2014, AAG contracted with an engineering firm to conduct an evaluation erosion study with possible fixes. My understanding is that AAG has had conversations about the erosion with the power joint authorities, but there has not been much progress. Notes from an AAG member state that " parts of the embankment along Creek Drive from Arbor to El Camino are seriously undercut and could affect the roadway". Five years later no work has started at the AAG property and the situation has worsened with slippage of soil down into the creek.
>
> At the June 5th 2019 community meeting, SFcjpa/Len Materman confirmed that the AAG property is a good candidate for bank fix. AAG wants to follow up on this issue to plan in conjunction with the joint powers authorities the complex project of bank stabilization and restoration.
>
> Thank you for your attention to this matter.
>
> Nancy Lianides
>
> Allied Arts Guild
> [redacted]
> Menlo Park 94025
>
> Allied Arts Guild - Welcome

Allied Arts Guild - Welcome

Website Design by LunaGraphica Inc

Allied Arts Guild is home to unique shops and artist studios, located among beautiful gardens and historic Europ...

-------- Original Message --------
Subject: COMMENTS ON DEIR
From: [redacted]
Date: Mon, June 24, 2019 2:05 pm
To: "Kevin Murray" <kmurray@sfcjpa.org>
CC: "C Snyder" <[redacted]

Dear Kevin,
Please find attached our comments on the Creek DEIR and confirm that you have received them in good order.
Thanks,
Curtis Snyder

June 19, 2019

COMMENTS ON THE SAN FRANCISQUITO CREEK UPSTREAM OF HIGHWAY 101 PROJECT DEIR

I44-1 We feel strongly that the replacement of the Pope/Chaucer bridge as currently proposed will impose significant negative impacts on the surrounding neighborhood and that these impacts have not been adequately addressed in the DEIR.

I44-2 1.) We continue to believe that the least impactful alternative would be to remove the existing bridge and not replace it.

I44-3 2.) Definitive resolution of an agreement with Stanford University for the construction of detention basins upstream on Stanford land must be reached as part of the DEIR process, before any certification of the DEIR or decision or approval to proceed with the project.

I44-4 3.) The current bridge replacement proposal represents a major road and bridge project in a sensitive environmental setting and in the midst of an established residential community full of families, with some homes approaching 100 years old.

4.) The bridge as currently proposed is significantly oversized, far exceeding its stated design capacity of 7500 cfs. Its capacity appears to be closer to 9300 cfs, uselessly oversized as the Middlefield bridge just upstream itself carries only a capacity of 7500 cfs.

5.) The oversized design requires unacceptable and negative grading impacts on the Woodland/Pope and Chaucer/Palo Alto intersections, effectively “sinking” the adjacent properties.

I44-5 6.) Access ramps for construction are proposed on the Menlo Park side only, imposing unacceptable negative impacts on Woodland Avenue. Heavy equipment transporting debris and construction material along this curvilinear and heavily wooded residential street to Highway 101 will disrupt the tranquility of the neighborhood, represent a safety hazard for families, possibly interrupt the movements of public safety and emergency vehicles, and likely cause damage to the roadway itself.

I44-6 7.) Noise and dust from demolition and construction will significantly impact the surrounding neighborhood (the driving of nearly 80 piles alone is an unacceptable impact), requiring mitigation measures such as retrofitting windows of adjacent homes with noise-reducing glazing and continual clean-up of spilled and windblown dust and debris.

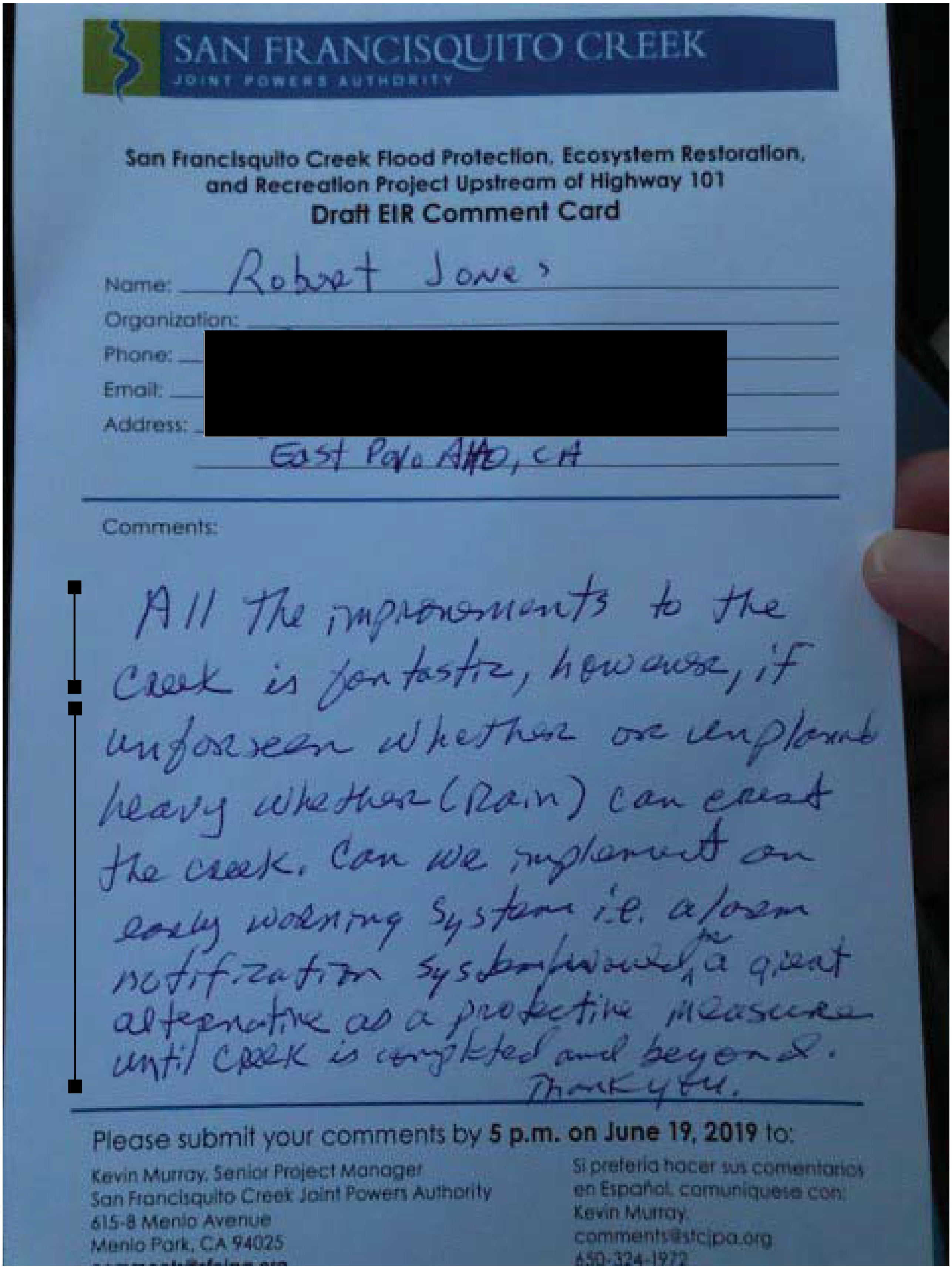
I44-7 8.) The described 9 month construction period will likely span more than one season, thereby prolonging unacceptable impacts. A detailed construction schedule must be posted as part of the DEIR.

I44-8 9.) The DEIR or a related document must include a detailed economic analysis of short and long term impacts of the project on residential values in the vicinity of the project.

I44-9 10.) A Citizens Advisory Committee must be formed to guide the design and implementation of any proposed replacement of the Pope/Chaucer bridge. This group should be appointed by the Councils of affected cities and include at a minimum the following: Planners, Architects, Engineers, Landscape Architects, Environmental Advocates, Historians, Educators, and affected Residents.

Respectfully submitted by Tate and Curtis Snyder, [redacted] Menlo Park.

Letter I45



SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101
Draft EIR Comment Card

Name: Robert Jones
Organization:
[redacted]
Phone:
Email:
Address:
East Palo Alto, CA

Comments:

I45-1 All the improvements to the creek is fantastic, however, if

I45-2 unforseen whether or unplanned heavy whether (Rain) can creat the creek. Can we implement an early warning system i.e. alarm notification system would be a great alternative as a protective measure until creek is completed and beyond.
Thank you.

Please submit your comments by **5 p.m. on June 19, 2019** to:

Kevin Murray, Senior Project Manager
San Francisquito Creek Joint Powers Authority
615-B Menlo Avenue
Menlo Park, CA 94025

Si preferia hacer sus comentarios en Español, comuniquese con:
Kevin Murray,
comments@sfcjpa.org
650-324-1972

-------- Original Message --------
Subject: Comments on Draft EIR for San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of 101
From: Pearl Kan [redacted]
Date: Wed, June 19, 2019 4:53 pm
To: "comments@sfcjpa.org" <comments@sfcjpa.org>

Dear Mr. Murray,

Please see the attached letter regarding the DEIR for San Francisquito Creek.

wittwer / parkin

June 19, 2019

VIA U.S. MAIL AND EMAIL

Mr. Kevin Murray
Senior Project Manager
San Francisquito Creek Joint Powers Authority
615-B Menlo Avenue
Menlo Park, CA 94025
comments@sfcjpa.org

Re: Comments on Draft Environmental Impact Report for San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Dear Mr. Murray:

This law firm represents Peter Joshua regarding the above referenced Draft Environmental Impact Report (DEIR), and we submit these comments on his behalf. Mr. Joshua has multiple concerns regarding the Project.

I46-1

After careful review of the DEIR, we have concluded that the document is woefully inadequate. The DEIR must be revised to address a number of issues that were not discussed, and released for a second round of public review.

Below, we provide specific itemized comments, each requiring a response pursuant to CEQA Guidelines § 15088(a).

I46-2

1) First and foremost, the DEIR on the one hand is designated a Program EIR, but then states that there is more detail for alternatives in Reach 2 of San Francisquito Creek. While more information is better where possible, it creates a bias towards the preferred project in Reach 2 over any options in Reach 3. The lack of full detail and options in Reach 3 renders the choice of a Reach 2 project a fait accompli. This is grave error.

I46-3

2) The most problematic procedural error with the DEIR is that it selects the proposed project as the environmentally superior alternative. (DEIR, page 4-10 – 11.) "If the environmentally superior alternative is the "no project" alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives." (14 Cal. Code Regs. § 15126.6(e)(2).) Based on the location of this requirement in the CEQA Guidelines, Section 15126.6 (Consideration of Alternatives to Proposed Project), and the distinction the Guidelines and caselaw universally make between the project on one hand and the alternatives on the other, the Project cannot be the environmentally superior alternative.

I46-3 cont'd

> [P]ublic agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects." (Pub. Resources Code § 21002.) "An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." (14 Cal. Code Regs. § 15126.6(a).) If the environmentally superior alternative is the "no project" alternative, the EIR shall also identify an environmentally superior alternative ***among the other alternatives***." (14 Cal. Code Regs. § 15126.6(e)(2) (emphasis added).) "[T]he purpose of an alternatives analysis is to allow the decisionmaker to determine whether there is an environmentally superior alternative that will meet most of the project's objectives, the key to the selection of the range of alternatives is to identify alternatives that meet most of the project's objectives but have a reduced level of environmental impacts.

I46-4

Watsonville Pilots Assn. v. City of Watsonville (2010) 183 Cal.App.4th 1059, 1089.

It would be pointless if an agency could simply adopt the proposed project as the environmentally superior alternative. The California Supreme Court stated that CEQA requires agencies to adopt feasible alternatives when there are unavoidable impacts of a proposed project.

> CEQA does not authorize an agency to proceed with a project that will have significant, unmitigated effects on the environment, based simply on a weighing of those effects against the project's benefits, **unless the measures necessary to mitigate those effects are truly infeasible**. Such a rule, even were it not wholly inconsistent with the relevant statute (id., § 21081, subd. (b)), would tend to displace the fundamental obligation of "[e]ach public agency [to] mitigate or avoid the significant effects on the environment of projects that it carries out or approves whenever it is feasible to do so" (id., § 21002.1, subd. (b)).

City of Marina v. Board of Trustees of California State University (2006) 39 Cal.4th 241, 368-369 (emphasis added); see also *County of San Diego v. Grossmont-Cuyamaca Community College Dist.* (2006) 141 Cal.App.4th 86, 98, 108, fn.18. Employing mitigations and alternatives are substantive mandates, not mere perfunctory informational requirements which SFCJPA can ignore by simply identifying the proposed project as the environmentally superior project. The Court of Appeal echoed the holding of the Supreme Court:

> Further, the Legislature has also declared it to be the policy of the state "that public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects . . . ." (§ 21002.) "Our Supreme Court has described the alternatives and mitigation sections as 'the core' of an EIR." (*Los Angeles Unified School Dist. v. City of Los Angeles* (1997) 58 Cal.App.4th 1019, 1029.) In furtherance of this policy, section 21081, subdivision (a), "contains a 'substantive

I46-4 cont'd

> mandate' requiring public agencies to refrain from approving projects with significant environmental effects if 'there are feasible alternatives or mitigation measures' that can substantially lessen or avoid those effects." (*County of San Diego v. Grossmont-Cuyamaca Community College Dist.* (2006) 141 Cal.App.4th 86, 98, italics omitted; *Mountain Lion Foundation v. Fish & Game Com.* (1997) 16 Cal.4th 105, 134.)

Uphold Our Heritage v. Town of Woodside (2007) 147 Cal.App.4th 587, 597-598 (review denied); *Center for Biological Diversity v. County of San Bernardino,* (2010) 185 Cal.App.4th 866, 883.

I46-5

3) The proposed project is set up to be the environmentally superior alternative even though the Reach 3 alternatives have far less environmental impacts. (DEIR, page 4-10.) The basis for this conclusion is that "the proposed project would permanently restore hydrologic functions and enhance habitats in the San Francisquito Creek channel. Due to these environmental benefits, the proposed project is identified as the environmentally superior project." Even if SFCJPA could designate the proposed project as the environmentally superior project, which it cannot, the agency cannot designate a less environmentally friendly project as environmentally superior based on vague "environmental benefits" that are not fully defined. This is particularly true since the proposed project has significant and unavoidable environmental impacts. "CEQA does not authorize an agency to proceed with a project that will have significant, unmitigated effects on the environment, based simply on a weighing of those effects against the project's benefits, **unless the measures necessary to mitigate those effects are truly infeasible**." *City of Marina v. Board of Trustees of California State University, supra,* 39 Cal. 4th at 368-369 (emphasis added)

I46-6

4) The DEIR does not set forth a reasonable range of alternatives. CEQA requires that the decisionmakers be given the ability to make a reasoned choice among the alternatives. *San Bernardino Valley Audubon Society, Inc. v. County of San Bernardino* (1984) 155 Cal.App.3d 738, 750-751.

> The core of an EIR is the mitigation and alternatives sections. The Legislature has declared it the policy of the State to "consider alternatives to proposed actions affecting the environment." ... . [I]t is the policy of the state that public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects ... .

Preservation Action Council v. City of San Jose (2006) 141 Cal.App.4th 1336, 1350-1351.

> An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives. An EIR need not consider every

> conceivable alternative to a project. Rather it must consider a reasonable range of potentially feasible alternatives that will foster informed decisionmaking and public participation. An EIR is not required to consider alternatives which are infeasible. The lead agency is responsible for selecting a range of project alternatives for examination and must publicly disclose its reasoning for selecting those alternatives. There is no ironclad rule governing the nature or scope of the alternatives to be discussed other than the rule of reason." (CEQA Guidelines, § 15126.6, subd. (a).)

Watsonville Pilots Assn. v. City of Watsonville, supra, 183 Cal.App.4th at 1086.

I46-6 cont'd

The DEIR states that the Reach 2 and Reach 3 have two separate projects, with Reach 2 including the proposed project and one alterative. What is clear, however, is that the projects in Reach 3 are not separate alternatives at all. The DEIR at page 1-7 states that "this Draft EIR also discusses a project in Reach 3 ***that complements the preferred alternative*** by increasing the level of flood protection afforded solely by Reach 2 project from 7500 cfs to almost 8,500 cfs." (Emphasis added.) The DEIR also states on page 107 that "While more difficult to achieve in the near term than a Reach 2 project, a project in the upstream areas of Reach 3 that results in temporary detention of extreme flows is a ***critical piece of SFCJPA's overall strategy*** to reduce risk and costs in our communities." (See also DEIR at page 2-12 (emphasis added).) The DEIR at page 3.8-10 discusses the Newell Road and Pope-Chaucer Bridges and that "***in concert with an upstream detention project*** that would temporarily remove at least 800 cfs during a 100-year storm, each bridge would not cause flooding during that size event." (Emphasis added.) Finally, the DEIR concludes that "The Reach 3 alternatives could be implemented following further, more detailed, analysis under CEQA to increase flood protection ***after one of the Reach 2 alternatives is constructed***. With this strategy, implementation of a Reach 2 and ***a Reach 3 alternative may be considered part of an overall program***." (DEIR page 4-4 (emphasis added).) Given these statements, it is clear that the Reach 2 and Reach 3 projects are intertwined. They are not separate alternatives at all. Therefore, SFCJPA has not chosen a range of alternatives. Instead, it has chosen only one alternative to analyze in the DEIR: the Floodwalls Alternative. Therefore, the DEIR is fatally flawed.

I46-7

5) Why does the DEIR not consider a more expansive Reach 3 Alternative that can produce water retention benefits upstream during major storm events that also includes habitat restoration only in Reach 2? The DEIR falsely claims that there are environmental benefits to the proposed project despite the fact that Reach 3 projects have less environmental impacts, including for significant unavoidable impacts. The Reach 2 projects attempt to rejigger an already severely impacted urban/suburban creek to accommodate water that is far more disruptive to the community. If the project in Reach 2 were focused exclusively on habitat restoration to the extent feasible in this constrained environment, rather than focused on water retention and increased flow, a superior project that protects existing Steelhead that would be less impacted during construction, and can also be less disruptive to the community. (As the DEIR admits at page 3.3-42, "While the present-day hydrology of the San Francisquito Creek watershed has been highly altered, the creek still supports an anadromous run of steelhead up to

I46-7 cont'd

Searsville Dam and in the tributaries with confluence below Searsville Dam.") Instead, the DEIR focuses on the Reach 2 project with the Reach 3 projects appearing to be more of a complement to the Reach 2 projects. Moreover, the increased flow will increase erosion and sedimentation. Therefore, another more environmentally beneficial must be considered. Note that

> Even as to alternatives that are rejected, however, the 'EIR must explain why each suggested alternative either does not satisfy the goals of the proposed project, does not offer substantial environmental advantages or cannot be accomplished.'" (*Id.* at p. 1458; see Cal. Code Regs., tit. 14, § 15091, subd. (c) [when agency finds alternatives are infeasible it must "describe the specific reasons for rejecting" them].)

Center for Biological Diversity v. County of San Bernardino, supra, 185 Cal.App.4th at 883; *Preservation Action Council v. City of San Jose*, *supra*, 141 Cal. App.4th at 1354.

I46-8

6) The DEIR describes Stanford University's studies and plans related to the Searsville Dam and Reservoir. The DEIR states at page 1-6 that "Should Stanford University decide not to pursue the project at Searsville by the time SFCJPA implements its project in Reach 2, SFCJPA may pursue the implementation of one or more detention basins in other locations on University property." However, this is a ruse. The DEIR at page 3.8-7 states that 15,000 cubic yards of sediment is deposited in the reservoir each year. In fact, the DEIR envisions that if nothing is done, that the dam will fill with sediment leading to more water and sediment entering San Francisquito Creek. **Why has SFCJPA not pursued a project that involves the Searsville Dam and Reservoir?** The DEIR at page 2-5 states that the projects in Reach 3 are both on Stanford lands in any event. The Searsville Dam and Reservoir Project must be considered an alternative to the proposed project. The Draft EIR at page 3.8-19 states that "The SFCJPA's evaluation indicates that the if Stanford implements its preferred project at Searsville Dam and Reservoir and flushes accumulated sediment downstream, then the University may need to work with the SFCJPA to remove some sediment downstream after the initial flushing is complete." The DEIR also notes on page 3.8-41 that when the Searsville Dam project is "combined with the Preferred Alternative, the flood capacity of San Francisquito Creek would be enhanced compared to existing conditions, resulting in a net positive effect for flood flow conveyance in the creek." **The DEIR must consider a Searsville Dam and Reservoir alternative to the proposed project.**

I46-9

7) The DEIR on page 3.8-22 states that "The return of the watershed's sediment transport to historic conditions could cause transient aggradation of the channel, which could reduce conveyance capacity. However, because this is not considered an impact of the project, but rather the future filling of Searsville Reservoir or the result of a future project by another entity, no mitigation is required at this time." (See also, DEIR at pages 3.8-23, 3.8-25, 3.8-27, 3.8-32, 3.8-34, 3.8-35 – 36.) This again shows that the Searsville Dam and Reservoir project must be considered as an alternative.

I46-10 8) The DEIR at page 3.8-31 and 3.8-34 calls for an Adaptive Management Plan to mitigate for sedimentation as a result of erosion impacts associated with increased flows from the Channel Widening Alternative. This Adaptive Management Plan would "monitor creek flows for signs of increased erosion at … 12 sites and identify and implement additional erosion control as needed… ." Then the DEIR describes the plan as nothing more than monitoring. (See DEIR pages 3.8-32 – 33.) This is an illegal deferral of analysis of environmental impacts and mitigations.

> By deferring environmental assessment to a future date, the conditions run counter to that policy of CEQA which requires environmental review at the earliest feasible stage in the planning process. (See Pub. Resources Code § 21003.1; *No Oil, Inc. v. City of Los Angeles, supra*, 13 Cal.3d 68, 84.) In *Bozung v. Local Agency Formation Com., supra*, 13 Cal.3d 263, 282, the Supreme Court approved "the principle that the environmental impact should be assessed as early as possible in government planning." Environmental problems should be considered at a point in the planning process "where genuine flexibility remains." (*Mount Sutro Defense Committee v. Regents of University of California, supra,* 77 Cal.App.3d 20, 34.) A study conducted after approval of a project will inevitably have a diminished influence on decision making. Even if the study is subject to administrative approval, it is analogous to the sort of post hoc rationalization of agency actions that has been repeatedly condemned in decisions construing CEQA. (*Id.* at 35, *No Oil, Inc. v. City of Los Angeles, supra,* 13 Cal.3d 68, 81; *Environmental Defense Fund, Inc. v. Coastside County Water Dist.* (1972) 27 Cal.App.3d 695, 706)

Sundstrom v. Cty. of Mendocino (1988) 202 Cal.App.3d 296, 307.

I46-11 9) The DEIR also illegally defers analysis and mitigation with respect to conducting vibration monitoring. The DEIR at page 3.10-21 states that vibration exceeds the specified standard, "alternative methods of construction and excavation will be considered to prevent possible exposure of vibration-sensitive buildings and structures to levels of 0.2 in/sec PPV or higher."

I46-12 10) The DEIR again illegally defers analysis and mitigation with respect to sensitive habitats. Mitigation MM-BIO-7 states that "To avoid unnecessary damage to or removal of sensitive habitat, the SFCJPA will retain a qualified biologist or ecologist to survey and demarcate sensitive habitat on or adjacent to the proposed areas of construction in San Francisquito Creek." This is also an illegal deferral of impact analysis regarding biological resources.

I46-13 11) The DEIR at page 2-3 asserts that two baseline conditions were used in order to disclose impacts associated with existing and projected future impacts of project alternatives. Is the reference to future conditions only with respect to the future condition of the Searsville Dam? As the DEIR on page 3.8-18 states, under existing conditions, storm flows would be attenuated and sediment retained behind the dam. However, that changes under future conditions and would vary based on annual precipitation.

I46-14 12) The proposals for the Searsville Dam call for flushing sediment through San Francisquito Creek. As an alternative, why is excavating and trucking sediment from Searsville Reservoir not considered as an option?

I46-15 13) The DEIR provides no context for the historic sediment loading that is discussed in the DEIR in a few places and the current issues regarding sedimentation. For instance, the DEIR on page 3.8-22 states that "The return of the watershed's sediment transport to historic conditions could cause transient aggradation of the channel, which could reduce conveyance capacity. What is the historic sediment load naturally occurring in San Francisquito Creek compared to existing conditions? This is also important to understand given that the DEIR at page 3.8-30 states that "the creek is currently listed on the State Water Board 303d list as impaired for sediment/sedimentation," and much of the analysis concerning erosion and sedimentation is difficult to understand without further information about how the natural system used to operate, compared to the present and future conditions with the project. This also impacts the assessment of how Steelhead will cope with the project.

I46-16 14) Will the Environmental Commitments that are listed in Section 2.9 of the DEIR be incorporated in the Mitigation Monitoring Program for the Project?

15) If the Environmental Commitments will not be incorporated in the Mitigation Monitoring Program, how will the Environmental Commitments be enforced?

I46-17 16) The Pope-Chaucer Bridge Rendering Aerial View found on page 3.1-20 (Image 3.1.1) has little context since there is not a current aerial view that provides a comparison. Please provide a current aerial view so that they may be compared.

I46-18 17) The DEIR at page 3.1-29 states that "All project lighting features would be installed in accordance with applicable regulations designed to avoid spill light and glare." Which regulations apply? The DEIR provides no context or ability for the public to assess whether light and glare will not have a potentially significant impact.

I46-19 18) With respect to air quality impacts related to construction of either the Channel Widening or Floodwalls Alternatives, which are already significant and unavoidable, the DEIR fails to discuss emissions from the demolition of the Pope-Chaucer Bridge and other demolition work within the channel. The DEIR must discuss these impacts in more detail.

I46-20 19) The Newell Road Bridge project being undertaken by the City of Palo Alto in conjunction with the proposed Project that is the subject of this DEIR, will together result increase channel flow capacity to 7,500 cfs. If this is true, how much would the preferred project and each of the alternatives alone increase channel flow capacity?

I46-21 20) The DEIR does not consider the impacts of the Project on Reach 1 of San Francisquito Creek or San Francisco Bay. Increased flow and erosion may impact both. The DEIR's failure to consider these impacts is fatal to its adequacy. The DEIR must address these

I46-21 cont'd

impacts. Environmental review is inadequate when "it fails to provide sufficient evidence or analysis of the potential environmental effects of the [Project]. 'The agency should not be allowed to hide behind its own failure to gather relevant data.'" *City of Redlands v. County of San Bernardino* (2002) 96 Cal.App.4th 398, 408.

I46-22

Pursuant to Public Resources Code § 21167(f), we are requesting SFCJPA forward a Notice of Determination to us if and when the Project is finally approved. That section provides:

> If a person has made a written request to the public agency for a copy of the notice specified in Section 21108 or 21152 prior to the date on which the agency approves or determines to carry out the project, then not later than five days from the date of the agency's action, the public agency shall deposit a written copy of the notice addressed to that person in the United States mail, first class postage prepaid.

Thank you for your consideration of these comments. I look forward to the SFCJPA's written responses.

Very truly yours,
WITTWER PARKIN LLP

by YPE

William P. Parkin

cc: client

-------- Original Message --------
Subject: San Francisquito Creek flood protection
From: William Reller [redacted]
Date: Fri, June 28, 2019 4:51 pm
To: "city.council@cityofpaloalto.org" <city.council@cityofpaloalto.org>,
"tcr@stanford.edu" <tcr@stanford.edu>, Materman Len <len@sfcjpa.org>,
"jpa@sfcjpa.org" <jpa@sfcjpa.org>

I47-1 I am in complete support of current efforts to provide creek improvements (in addition to those completed downstream in 2018) that will replace the Pope-Chaucer Bridge and widen the channel downstream. It is remarkable that this complex project has had so much success to date given at least five governmental jurisdictions working in collaboration. A credit to all!

I47-2 I live in Palo Alto on Crescent Cr, the land parcel extending to the center of San Francisquito Creek (only a little flooding in 1998!). It continues as a second parcel across the creek with frontage on Woodland Ave, Menlo Park. Should there be some advantage in my deeding that parcel to others I would so consider.

Thank you for all your efforts.

William Reller
[redacted]

Comments letters from organizations

May 9, 2019

Letter O1

Len Materman, Executive Director
San Francisquito Creek Joint Powers Authority
615-B Menlo Avenue
Menlo Park, CA 94025

SUBJECT: San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101: Draft Environmental Impact Report – April 2019

Dear Mr. Materman,

O1-1

Please accept this letter on behalf of the Steering Committee of the Crescent Park Neighborhood Association in enthusiastic support of the objectives, scope, and option alternative analyses of your Draft Environmental Impact Report (DEIR) for the Flood Protection, Ecosystem Restoration and Recreation Project for reach 2 of San Francisquito Creek (SFC) upstream of Highway 101, dated April 2019. We urge you to proceed with all dispatch to prepare the way and implement your Alternative 2 as an effective solution to the most immediate SFC flood threat.

As you noted many times, Crescent Park was one of the communities most heavily affected by the flood of record that occurred on February 3, 1998 — more than 21 years ago. Many in our community suffered heavy property losses because of that flood as part of the overall $28M in damages. We were fortunate that there was no loss of life from that event. Since that time, Crescent Park has had several additional close calls during which the Pope-Chaucer bridge came perilously close to overtopping.

We have an email-based Neighborhood Association network service for our community with over 950 people signed up. We can attest to the deep anxiety expressed by our residents with every winter rainy season. As storms approach, everyone holds their breath wondering if this will be another 1998 event, and should we deploy sandbags or evacuate. With this repeated exposure to flooding dangers, many in the community have lost confidence in the governmental processes that have gone on and on in pursuit of a solution to SFC flooding dangers. Our community has come to understand that to “fix” the creek we need to start at the bay and work our way upstream. The Highway-101-to-bay project is now complete, with exceptional design and implementation details, including flood protection, enhanced habitat, and improved recreational facilities That said, the prospect for a solution that will protect Crescent Park still seems years away, while the on-going effects of climate change are cause for more and more extreme weather events. We urge you to pursue this preparation for real flood protection with full commitment and speed, knowing that the technical, governmental permitting, and funding processes must all come together in parallel.

As we look back over the years (in reality, decades), much has been done to study the technical, ecological, aesthetic, recreational, and financial characteristics of the 17 alternatives considered in this DEIR to increase the capacity of reach 2 of the creek. These have included a complete new measurement of the creek topography, cross-sections, and calibrated hydrology by the Army Corps of Engineers, using the most modern technologies. In addition, the Santa

Clara Valley Water District (SCVWD) engineers, Caltrans engineers, and successive outside civil engineering firms have studied alternative approaches to increase SFC capacity.

In June 2014, the SCVWD approved a “Modified Project” that would raise the capacity of the reach from Hwy 101 to the bay to contain a 100-year flow (now completed), but would only raise the capacity of the reach from Hwy 101 to Middlefield bridge to 7,200-7,500 cfs (your Alternative 2), the peak flow of record for the 1998 flood. Support for this plan was based on its functional capacity, technical feasibility, ecological enhancements, and funding projected to fully complete this project. We continue to believe that Alternative 2 is the most attractive and expeditious approach to achieving a significant reduction in flood threat to our community, while meeting the environmental goals of the study and being achievable within a politically feasible budget. It can be argued that Alternative 2 is the most effective way to return the creek to a more natural state (by minimizing unnecessary human built intrusions), while reducing flooding risk.

O1-1 cont'd

Even though Alternative 2 does not achieve a full 100-yr protection level, it does protect against the largest flood every recorded in the creek. Voltaire is often quoted as saying that the pursuit of the perfect should not be the enemy of achieving the good. In Alternative 2 of the DEIR plan, we believe that we can achieve the “good” with great effect, and have a future path to achieving the “perfect” – 100-yr protection. This future increment involves a collaboration with Stanford University to convert the Searsville dam from a sediment-filled relic to an active element in creek flood management as described in the DEIR *Alternative 3: Construct One or More Detention Basins* (Section 2.5.3).

We understand that the SFCJPA has worked diligently through the years to try to realize an upgrade to the creek *system*, including satisfying technical, ecological, and financial constraints for the various reaches of the creek, as well as the multiplicity of stakeholders and approval agencies involved. We sincerely appreciate these efforts. However, it is with this recurrent background of fear, delay, and frustration that we must restate the urgency of getting this next project plan for reach 2 of the SFC finalized, approved, and completed.

For these reasons, we give our full support and encouragement for the project that will be proposed following adoption of the well-documented and justified recommendations in this DEIR.

Sincerely yours,

The Crescent Park Neighborhood Association Steering Committee

Message --------
Subject: SFCJPA DEIR comments on San Francisquito Creek upstream of Hwy101
From: Patrick Samuel <psamuel@caltrout.org>
Date: Tue, June 18, 2019 8:38 pm
To: "comments@sfcjpa.org" <comments@sfcjpa.org>
Cc: "lmaterman@sfcjpa.org" <lmaterman@sfcjpa.org>, "kmurray@sfcjpa.org" <kmurray@sfcjpa.org>, "tbyler@sfcjpa.org" <tbyler@sfcjpa.org>, Gary Stern <gary.stern@noaa.gov>, "Cochran, Sean@Wildlife" <Sean.Cochran@wildlife.ca.gov>, Eric Wesselman <eric@friendsoftheriver.org>, Steve Rothert <srothert@americanrivers.org>, Redgie Collins <rcollins@caltrout.org>, Matt Stoecker <mattstoecker@mac.com>

O2-1

Please find attached joint comments from Beyond Searsville Dam and California Trout on the proposed Project on San Francisquito Creek upstream of Highway 101 draft EIR. These comments reflect earlier ones raised at one of the public hearings in Palo Alto and draw upon years of experience working with SFCJPA at the Searsville Working Group proceedings.

We hope these comments will ultimately help select a Project alternative that explicitly considers planned actions by Stanford University on Searsville Dam and Reservoir and finds a solution for the creek that will achieve flood reduction, fish passage, and environmental benefit goals.

Thank you for your consideration.

Sincerely,
Patrick Samuel

Bay Area Program Manager
California Trout

June 18 2019

Gary Kremen
Chair, Board of Directors
San Francisquito Creek Joint Powers Authority
615 B Menlo Avenue
Menlo Park, CA 94025
comments@sfcjpa.org

RE: Comments on the Draft Environmental Impact Report for the San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Dear Mr. Kremen,

We are writing to express our shared concerns over aspects of the draft Environmental Impact Report (DEIR) for the Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101 project (Project) prepared by the San Francisquito Creek Joint Powers Authority (SFCJPA) relating to completeness, environmental impact, cumulative impacts, and coordination with major partners on planned projects in the watershed before a preferred alternative is selected.

Friends of the River, Beyond Searsville Dam, and California Trout have been engaged in the San Francisquito Creek watershed for years and have worked to balance the needs of wild fish and people. We are eager to see ecological function restored in this critical watershed for federally threatened Central California Coast Distinct Population Segment (CCC DPS) steelhead (*Oncorhynchus mykiss irideus*).

The San Francisquito Creek watershed is home to federally threatened Central California Coast Distinct Population Segment (CCC DPS) steelhead (*Oncorhynchus mykiss irideus*) (79 FR 20802)[1] and once likely supported Central California Coast Evolutionary Significant Unit (CCC ESU) coho salmon (*Oncorhynchus kisutch*) as well.[2] Steelhead once inhabited the San Francisquito Creek watershed in significant numbers prior to the construction of dams, significant urban development, alteration of the channel in the lower watershed, and other development. San Francisquito Creek is considered an "anchor watershed" by the Center for Ecological Restoration and Management and supports an independent population necessary for the recovery and eventual de-listing of the DPS by the National Marine Fisheries Service.[3, 4] Under the latest statewide assessment of

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[1] *Federal Register*. April 14, 2014. Vol. 79(71).

[2] Center for Ecological Management and Restoration (CEMAR). 2005. Historical Status of Coho Salmon in Streams of the Urbanized San Francisco Estuary, California. 36pp. http://www.cemar.org/pdf/coho.pdf.

[3] CEMAR. 2007. San Francisco Estuary Watersheds Evaluation: Identifying Promising Locations for Steelhead Restoration in Tributaries of the San Francisco Estuary. 93pp. http://www.cemar.org/SFEWE/Full%20report.pdf.

[4] National Marine Fisheries Service. 2016. Coastal Multispecies Recovery Plan. National Marine Fisheries Service, West Coast Region, Santa Rosa, California. https://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/north_central_california_coast/Final%20Materials/Vol%20IV/coastal_san_francisco_bay_diversity_stratum.pdf.

steelhead status in California, CCC steelhead were found to be at risk of extinction in the next century if current threats and trends persist.[5]

The proposed SFCJPA Project is intended to ameliorate flood risk to human life and property while minimizing negative impacts to biological resources, yet we have concerns that the alternatives described will have negative impacts on habitat for native fishes including CCC steelhead that are not adequately addressed in the DEIR. We are also concerned that several key pieces of information are missing from this DEIR that were raised to SFCJPA, Stanford University, permitting agencies, and others through the Searsville Advisory Group back in 2015, including an emergency contingency plan in the event of Searsville Dam failure (CalOES approved Emergency Action Plan), dam removal flood attenuation and sediment study modeling results, and climate change impacts discussion that render this incomplete. We provide these comments to improve the revised Environmental Impact Report and help inform selection of a durable preferred project alternative that is compatible with upstream changes to Searsville Dam and its operation, will consider future stream and sediment conditions under a changing climate, restore ecological function where practicable, and avoid negative impacts to native fish. We request that comments and requests made in the attached documents, and previous made directly to the SFCJPA as part of the Searsville Work Group, be considered as comments and requests for this DEIS as well. The revised EIS should provide information and analyses that adequately address these outstanding issues with referenced studies or documents that will be part of the public record and draft in the final version.

1) The current analysis of alternatives is only for current conditions, and ignores future sediment, streamflow, and precipitation conditions in the watershed. There is no discussion of Searsville Dam in the DEIR. Success or failure of any project in these reaches depends upon being compatible with whatever decision is made regarding Searsville Dam and the considerable sediment stored behind it that is likely to be released and accumulate in proposed Project sites. Further, selection of a preferred alternative in the absence of a public document discussing details of what will occur on Stanford property is premature and imprudent; it would preclude serious and good-faith consideration by Stanford of all possible options regarding the dam and may eliminate potential options for various solutions to the fish passage and flood retention issues associated with Searsville Dam and Reservoir. Finally, an assessment of proposed Project alternatives must be assessed in a scenario of dam failure, the details of which are outlined in an internal Stanford University report (Attachment A: November 5, 2012 letter to California Department of Water Resources Division of Safety of Dams).
2) The Cumulative Impacts section of the DEIR is lacking in its completeness and consideration of likely future projects in the watershed, including regarding Searsville Dam as discussed above, and the cumulative impacts they would have on the watershed from proposed construction and maintenance activities.
3) The identification of alternatives has missed an important option that had been raised with Stanford University in Searsville Dam Advisory Group meetings in 2015 to deal with fish passage at Searsville Dam: utilizing the natural topography of the historical

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[5] Moyle, P., R. Lusardi, P. Samuel, and J. Katz. 2017. State of the Salmonids: Status of California's Emblematic Fishes 2017. Center for Watershed Sciences, University of California, Davis and California Trout, San Francisco, CA. 579 pp. https://watershed.ucdavis.edu/files/content/news/SOS%20II_Final.pdf.

willow sausal habitat upstream of present-day Searsville Reservoir in the upper marsh for flood attenuation and enhancement of fish rearing habitat. Modifying the mouths of Alambique, Corte Madera, Dennis Martin, and Sausal creeks and exploring creation of additional offstream detention basins nearby through dredging, replacing undersized culverts at Old La Honda Road, Portola Road, and Montecito Road and floodplain restoration should be analyzed to complete the realm of opportunities available if eminent domain were in fact to be used to seize Stanford University or other private property (Attachment B: May 5, 2015 email to SFCJPA; Attachment C: April 11, 2013 Searsville Initial Technical Studies Review and Recommendations letter; Attachment D: September 21, 2015 email to Permitting Agencies re: Searsville Dam Alternatives, Data Gaps, and Information Requests).

4) There is almost no mention of the potential impacts of sea level rise on potential Project alternatives which renders the DEIR incomplete. Similarly, alternatives should be viewed with their potential to disrupt and impact sediment delivery to San Francisco Bay and its eroding baylands, since any project work will have downstream impacts not only on San Francisquito Creek but also in surrounding bay habitats.

We also have specific comments on portions of the impact assessment that are incomplete or lack sufficient detail to determine potential impacts to native fishes, in order:

- "The Channel Widening Alternative and Flood Walls Alternative, Former Nursery Detention Basin Alternative and Webb Ranch Detention Basin Alternative are less than significant with mitigation or less than significant in the table". pg. 3.3-76

We disagree with this assessment, as any channel work that removes structure or habitat complexity for fish as part of construction or maintenance removes slow water refuge which is favored habitat for steelhead.

- "However, steelhead would be protected during construction by implementing MM-BIO-14, MM-BIO-15, MM-BIO-16, and MM-BIO-17. These include restricting construction to the dry season, decreasing pile driving noise, evaluating the stream and native aquatic vertebrates to determine if they are present, and relocating individuals as appropriate. Further, implementation of MM-BIO-6 would inform workers on how to identify steelhead. Implementation of all these mitigation measures will reduce impacts to a less-than significant level." pg. 3.3-77

Avoiding fish with seasonal construction does not lead to less than significant habitat impacts necessarily, yet this logic is a theme throughout the DEIR analysis. Placement of structures and the associated channel work such as rock slope protections, installation of piles at Pope-Chaucer Bridge, channel widening that alters the stream channel, and riparian vegetation removal all have the potential to degrade substrate and habitat for fish once it is wetted again. Removing riparian vegetation reduces shading that cools streams, overhead cover from predators, introduces terrestrial food sources, and eliminates future sources of large woody debris that are critical to create habitat complexity, scour pools, and velocity refuge for juvenile steelhead that are lost for the duration while newly-planted riparian vegetation takes its time to grow to maturity.

- "Aquatic habitat enhancement areas will be installed in the form of "three pool/riffle features along the restored channel at Pope-Chaucer Bridge and six velocity refuge features along widened reaches (rootwad or rock spur)." Pg. 3.3-83

There is a lack of design details that allow analysis of proposed habitat benefits from these structures under a variety of streamflows. The instream habitat improvements mentioned are not being considered for each location where large woody debris and potential sources of it (through riparian vegetation removal) is being removed in construction/maintenance, which we believe is an important oversight for mitigating unavoidable significant impacts. There is insufficient evidence to conclude that such work would result in a net benefit for habitat for native fishes and as such should not be used to justify selection of this project alternative component.

- "Floodwalls would be constructed along the channel continuously and have greater potential for disturbance along the bank and instream channel." 3.3-84

How will the floodwall construction impacts be mitigated? Creating floodwalls will increase the velocity of the water moving through these portions of stream, increasing potential for scour and downcutting, reducing buildup of suitable substrate to support benthic macroinvertebrates and native fishes, and reducing habitat suitability. Once this is done along the banks, any instream structures to benefit fish are less likely to persist as a result of velocity increases and elimination of other potential options at the site that will be foregone to put in the concrete floodwalls.

- Former Nursery Detention Basin Alternative/Webb Ranch Detention Basin Alternative "Construction of the detention basins is not likely to have any direct impacts on San Francisquito Creek or steelhead. However, construction of a weir in San Francisquito Creek could cause sedimentation and contaminant releases into the creek, which can be harmful to steelhead. Spawning habitat is available in Reach 3, and excessive sedimentation can smother eggs. Water quality protection environmental commitments would be implemented and protect water quality. If cofferdams need to be constructed to divert flow, however, fish could become stranded. Implementation of MM-BIO-14 would restrict construction to the dry season, and MM-BIO-17 would relocate fish if surface water is present. These mitigation measures would reduce this impact to less than significant." 3.3-85

How will impingement and or stranding be avoided in detention basins? Is there a way they could be designed to incorporate volitional access and egress for fishes to allow them to take advantage of the velocity refuge and feeding opportunities that floodplain habitats afford? Such habitats can be valuable to juvenile salmonids, especially in urbanized watersheds where velocity refuge and off-channel pond habitat is in short supply and should be designed to encourage periodic and volitional habitat usage as an important life history strategy.

- "Further, ongoing maintenance would be performed through adherence to project environmental commitments. There would be no new impact." 3.3-86

Ongoing maintenance associated with project work in the channel has the potential to significantly impact steelhead, especially if large woody debris is moved or removed and sedimentation is exacerbated where the work occurs as described above.

- "Two known projects will occur in the same area as the proposed project during the same time period: the Newell Road Bridge Replacement Project (Newell project) and the Searsville Dam Removal Project (Searsville project). The Newell project should be starting within the next year, and the Searsville project is still under discussion. The Newell project will replace the existing bridge and widen the creek channel under and downstream of the bridge. The proposed project and the Newell project will both remove riparian vegetation in order to facilitate the new bridges and also around the bridges to widen San Francisquito Creek channel. Both of these projects are required to replant any riparian vegetation and trees that they remove. Native vegetation will replace nonnative riparian and trees. This will be beneficial to steelhead. No negative cumulative impacts on biological resources are expected from the proposed project.

- The Searsville project would affect the creek downstream of the dam. Sedimentation release from behind the dam could negatively affect aquatic resources by decreasing water quality and aquatic habitat by filling in pool habitat. This project will include the appropriate mitigation for the impacts it has on aquatic resources. The proposed project would not release sedimentation into San Francisquito Creek, and no negative cumulative impacts on biological resources are expected... The project would therefore not make a cumulatively considerable contribution to a cumulative impact." Pg. 3.3-102

This inadequate and incomplete section represents the biggest concern we have with the current DEIR. This Project is not being proposed in a vacuum, but it is being treated as such in the document. There is a lack of coordination among SFCJPA and Stanford on Searsville evident in this minimal description quoted above, whose "Searsville Dam Removal Project" will necessarily release large amounts of sediment downstream that will undoubtedly have cumulative impacts on communities downstream and biological resources that must be explicitly accounted for in this planning phase. It is unacceptable not to consider planned project work in the watershed by a major partner that will fundamentally determine success or failure of the current Project proposal. The major in-channel work must be able to pass flood waters and flows, yet SFCJPA seems to have not considered one of the major sources of sediment into the creek that is likely to occur in the foreseeable future and during the lifespan of the Project.

It is premature and imprudent to select a preferred alternative on this Project without having a clear answer as to what will happen with Searsville Dam. The dam holds back considerable sediment that has the potential to cause any Project work to fail and exacerbate flooding risk downstream. Selecting a preferred alternative now may remove potential options for Stanford in their own future project work because of limitations from the future channel based on this Project. Worse still, it could force them into a proposed solution that will not adequately meet fish passage, flood risk reduction, or other objectives, as has been raised by permitting agencies in the past (Attachment E: March 30, 2015 Letter from the San Francisco Bay Regional Water Quality Control Board to Stanford University).

SFCJPA has long known, through their own studies, Searsville Working Group participation, and attached documents, that the current hydrologic and sediment transport conditions below Searsville Dam are artificial and that massive change is imminent, regardless of when or if Stanford University takes any action at the dam. For example, as noted in the Searsville Working Group, a single large storm event (especially following a fire) without any University action could completely fill the reservoir in and all downstream projects and infrastructure would be dealing with hydrologic and sediment transport. Alternatively, a proposed Searsville Dam modification or removal would change existing conditions downstream dramatically. There is no active or passive scenario being considered right now that results in the current hydrologic and sediment transport conditions persisting for the lifespan of the proposed Project. It is therefore irresponsible for SFCJPA to propose Project designs based on soon-to-be-altered creek conditions. Such an approach could also significantly limit future projects being actively planned and result in reduced flood protection and/or ecological benefits. For example, if the JPA channel modification or bridge designs are undersized based on current conditions. then imminent conditions with higher sediment transport and/or reduced channel capacity could overwhelm the proposed infrastructure. Design considerations for the proposed Project must consider adequate sediment transport whether the dam was modified, removed, or filled in without action. SFCJPA and its consultants have extensive models and analysis describing the coming changes with Searsville, yet fails to provide them or to utilize them in considering and developing alternatives. This is a fundamental and unacceptable flaw in the DEIS.

The undersigned groups advocate for a requirement through the Biological Opinion terms and conditions process (NMFS) or 1600 Lake and Streambed Alteration conditions process (CDFW) for SFCJPA to formally coordinate with Stanford to ensure that a clear public plan for Searsville Dam and any associated work is released before a preferred alternative for this Project is selected. Success or failure of any proposed Project will be dictated by finding an effective fish passage and sediment management solution at Searsville Dam that ameliorates flood risk for downstream communities and reduces risk of loss of life or property.

While formal Section 7 Consultation under the Endangered Species Act with the National Marine Fisheries Service will be required privately with SFCJPA out of this process, we request that a project of this scale and significance be opened to greater public review to ensure an alternative is selected that is compatible with upstream operational changes at Searsville Dam. In addition to the permitting agencies (NMFS, the California Department of Fish & Wildlife, the San Francisco Regional Water Quality Control Board, and others) our groups would like to re-engage with Stanford and SFCJPA through the Searsville Working Group to ensure that critical Project components are compatible with, and adequately address, the significant technical concerns raised with Searsville Dam operation. These discussions should have public release of necessary documents as required outcomes, which can then inform decision making and public comment to shape revision of the DEIR before release of a complete and sufficient EIR and eventual selection of a preferred Project alternative.

Thank you for your careful consideration of these comments. Please contact us if you have any questions about these comments or need any additional information.

Sincerely,

Matt Stoecker

Patrick Samuel, Bay Area Program Manager, California Trout
Matt Stoecker, Director, Beyond Searsville Dam
Eric Wesselman, Friends of the River
Cc:
Len Materman, San Francisquito Creek Joint Powers Authority: lmaterman@sfcjpa.org
Kevin Murray, San Francisquito Creek Joint Powers Authority: kmurray@sfcjpa.org

Tess Byler, San Francisquito Creek Joint Powers Authority: tbyler@sfcjpa.org
Redgie Collins, California Trout: rcollins@noaa.gov
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Sean Cochran, California Department of Fish & Wildlife: sean.cochran@wildlife.ca.gov

Attachment A: November 5, 2012 letter to California Department of Water Resources Division of Safety of Dams

David A. Gutierrez
November 5, 2012

Chief, Division of Safety of Dams California Department of Water Resources
Dave.Gutierrez@water.ca.gov Sent via e-mail

Re: Searsville Dam (No. 614) Safety Information and Request

Dear Mr. Gutierrez,

Thank you for your September 27, 2012 letter and the time spent on our recent phone call. I appreciate your thoughtful consideration of the safety issues we have brought up with Stanford University's Searsville Dam and your direction to Division of Safety of Dams (DSOD) staff to further investigate several issues we covered. As discussed, we submit the following information and requests regarding Searsville Dam safety. As described, we remain deeply concerned, based on information below, that Searsville Dam does not comply with DSOD safety requirements, that current and planned Stanford management activities at Searsville do not appear to adequately address existing and imminent safety concerns as conditions rapidly change at the reservoir, and, as a result, the dam poses a significant hazard to life and property upstream and downstream.

Searsville Dam Safety Compliance Concerns

We believe that data presented here shows that Searsville Dam is either not in compliance with DSOD safety requirements, or additional assessment is needed to make an informed determination. This letter addresses the following issues:

1) Spillway Adequacy and Associated Scour 2) Outlet Valves and Emergency Drainage Adequacy 3) Dam and Reservoir Relationship to Upstream Flooding 4) Cracks in the Dam and Seepage 5) Seismic Stability and Reservoir-Induced Seismicity 6) Surveillance Monitoring

As conditions at Searsville Dam and Reservoir, as well as upstream and downstream, rapidly approach a significant change with the reservoir becoming filled in with sediment, the matter of Searsville Dam safety has become urgent. As shown in this letter, the configuration of the dam, reservoir, and outlet drainage capacity have changed from the original design plans and data with DSOD certification documents. Several DSOD safety calculations and conclusions appear to be based on previous conditions that no longer exist and, in some cases, outdated or undefined data. As noted below, reservoir sedimentation has reduced outlet conveyance and emergency drainage capacity. The spillway no longer has control gates and fails to adequately convey moderate flood events, resulting in overtopping of the entire dam crest and associated scour of "weak" abutment material. Experts have predicted that Searsville Reservoir may fill in completely with sediment within the next major flood event and the reportedly unfinished, stepped face of the dam and abutments would experience elevated sediment mobilization and scour. The presence of the dam, subsequent raising of the dam height, and construction of the Searsville Causeway have been identified by experts as primary factors in the ongoing sedimentation and flooding problem upstream of the reservoir onto private property. Proposed Stanford management actions within the reservoir area, such as channel excavation and re-routing of Corte Madera Creek, are expected to result in the more rapid filling of the main reservoir and elevated sediment transport downstream. Previous reports commissioned by Stanford and others have acknowledged that such uncontrolled, and unmitigated, addition of sediment to the downstream channel has negative impacts to both downstream flooding and listed wildlife.

While Stanford continues to study Searsville Dam, we know of no long-term plan to address these imminent safety concerns. We note that almost a decade ago the Department of Water Resources offered to study alternatives to address Searsville as part of a collaborative Searsville Working Group and Stanford declined this offer. The currently proposed Stanford Habitat Conservation Plan, a project proposal almost 10 years in the planning, specifically excludes covered activities for Searsville despite the fact that complete filling of the reservoir with sediment is expected to occur within the timeframe of the HCP. More recently, the 5-24-2007 DSOD inspection report stated that a detailed foundation inspection of Searsville Dam was warranted: “It has been approximately 40 years since this inspection was performed and approximately 117 years since the construction of this dam. The dam has aged and undergone few earthquakes since then. In light of the above mentioned reasons, it would be prudent to dewater the pool and observe the downstream toe, groins, and foundation conditions with field branch personnel and geology branch.” At our request, DSOD recommended that Stanford coordinate and carry out this inspection and in 2010 Stanford requested more time to carry this inspection out by the end of 2012. This inspection will not be occurring before the end of 2012 and we understand from the Department of Fish and Game that Stanford had not contacted them about permitting this inspection and creek dewatering until this year; almost 5 years after the DSOD inspection report noted that a detailed survey of the dam was warranted.

The safety implications surrounding Searsville Dam’s present condition, ongoing and planned management, and imminent change in sediment transport are profound. As noted by your agency, and cited by the U.S. Army Corp of Engineers and County of San Mateo, Searsville Dam is categorized as a “High Hazard” dam with “probably loss of lives and property damage” in the event of a failure. The 2006 SPEAR3 Final Safety Assessment Document notes the catastrophic outcomes of a Searsville Dam failure: “Another study, entitled "Flood Studies, Limits of Flooding in the Event of a Failure of Searsville Dam owned by Stanford University" (Delta Consulting Engineers 1974), mapped the flood plain that would result from the maximum catastrophic failure of the Searsville Dam and the corresponding release of 60,433 cfs. This release is about 6 times the 500-year peak flow of 10,500 cfs for San Francisquito Creek and Los Trancos Creek combined.” See the “Dam Failure Inundation Area-San Mateo County” map in the Appendix section to see the massive extent of the predicted flooding in Menlo Park, Stanford, Palo Alto, and East Palo Alto. The San Mateo County “Earthquake Shaking” map for the San Andreas Fault shows Searsville Reservoir and Dam within the maximum shaking zones (see Appendix). The San Mateo County “Earthquake Liquefaction” map shows the highest levels of liquefaction occurring at Searsville Reservoir (see Appendix). Finally, the “FEMA Flood Zones in San Mateo County” map shows the dam-related sediment depositional areas upstream of Searsville Dam, and the remaining open water of the reservoir, categorized as “Inundated by 100-Year flooding” (see Appendix). The FEMA flooding area clearly encompasses the original reservoir boundary area, current dam-influenced sediment depositional areas, and flood flows backing up the inlet streams behind the sediment deposits. Due to the safety concerns outlined above and detailed below, we request the following from the Division of Safety of Dam:

Short-term- 1) Requirement that Stanford coordinate with DSOD and complete the already discussed Searsville Dam inspection and associated reports by the end of 2013, with additional detail described in this letter. 2) DSOD utilize Section 6081 of the California Water Code to order Stanford to lower the reservoir elevation to prevent further upstream sediment deposition and related flooding on private lands and roadways.

Long-term- 1) DSOD utilize Section 6081 of the California Water Code to order Stanford to develop and submit a long-term plan for Searsville Dam, with watershed stakeholder input, that reduces or eliminates Searsville-caused sediment deposition and associated upstream flooding on private lands and eliminates other identified safety concerns associated with the dam and operations by the end of 2014. 2) With the above plan, and if Stanford intends to keep the dam in place, we request that DSOD require Stanford to recertify the dam inputting updated and accurate data since previously entered data points, and resulting calculations, have changed.

Thank you for your consideration of the enclosed information, DSOD staff research into this matter, and response. Please contact me with any questions.

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(650) 380-2965

Cc:
Richard Roos-Collins, Water and Power Law
Steve Rothert, California Director, American Rivers Inc.
Beyond Searsville Dam Board and Advisory Council

Attachment B: May 5, 2015 email to SFCJPA Executive Director

From: Matt Stoecker <mattstoecker@mac.com>
Date: May 5, 2015 at 12:18:54 PM PDT

To: Len Materman <len@sfcjpa.org>
Subject: Flood Attenuation - Searsville
Hey Len,

I'd like to jump on a call with you to discuss what was said at the last AG meeting regarding flood attenuation for the different alternatives. Specifically, how the orofice option compares to the dam removal option combined with all the flood attenuation features we discussed, and Stanford left out of the Nov 13 meeting table and analysis. Pat F., Steve R. and I all recall (and I have notes confirming this) that the consultants acknowledged that their Dam Removal numbers didn't include the larger off-stream detention pond and reservoir area attenuation and controls at middle and upper reservoir areas and floodplains. Jonathan Owens acknowledged that dam removal with these features would be on par with the orofice option in terms of flood attenuation and without debris blockage and dam failure risks. They told us at that meeting that they would get back to us with updated numbers including those features…. and never did.

Based on Chris Field's comments about the orofice performing better than all others, I'm concerned that the Steering Committee did not receive those updated numbers either. Their announcement is promising, I think, in that it supports many of the needed changes to accommodate dam removal (storage, diversion location, well-managed sediment transport). I'm confident that the resource agencies will not permit leaving the dam in place as a flood control structure due to ongoing debris blockage, fish passage issues, and chronic siltation within and downstream of the reservoir area. NMFS has been pulling permits and requesting removal of these kinds of dams elsewhere.

I think there is a unique opportunity right now to tweak this orofice alternative so that it is part of dam removal (as it has been used elsewhere to flush sediment in a controlled way), to build out all downstream flood protection measures, and then remove the dam when everything is ready. This would get agency support, funding support, and could be implemented faster. As with the Ventura River, Elwha, Rogue and other projects, I think a San Francisquito Creek Ecosystem and Flood Protection plan that incorporates all that is needed would gain strong permitting and funding support, while the orofice and fill in options will languish and fail to achieve what is needed in a basin wide approach.

You and the JPA have a lot of power right now to help direct where this goes. I'd be interested in talking got you about an approach that achieves all of the needed flood protection and ecosystem improvement measures in an attractive package. It might be multi-phase, but the end result and plan is what agencies/funders would really be drawn into.

Would love to talk more if you have some time.
650-380-2965
Matt

Attachment C: April 11, 2013 Searsville Initial Technical Studies Review and Recommendations

Searsville Initial Technical Studies Review and Recommendations

Submitted by Technical Studies Subcommittee members: Matt Stoecker, Beyond Searsville Dam
Steve Rothert, American Rivers 4-11-13

Page 1- Additional Technical Study Needs
1) Summary of Existing Biological Conditions- Add Hydro and Geomorph 2) Summary of Historical Ecology/Hydro/Geomorph Conditions (pre-dam) 3) Summary of Searsville History, Existing Facilities and Operations 4) Steelhead Monitoring Program 5) Summary of Existing Searsville Dam Safety Issues 6) Searsville-related Flood Attenuation Options 7) System Response tasks- For each alternative add Public Safety and Climate Change Discussion 8) Addition of "System response to Hybrid Alternatives" task with at least 2-3 alternatives discussed.

Creek Gage Installation and Monitoring
1) Studies scope descriptions of flow monitoring appear to be focused on "peak-flow" and do not appear to also focus on "base-flow" and critical summer/fall surface flow (amount, extent, duration) data needs, which are critical to developing interim measures, describing existing biological conditions, and assessing fish passage and other Searsville alternative responses. Request- Add detailed base-flow monitoring before later Spring and extend this effort through at least the end of 2014 to capture at least two seasons and variable conditions. 2) Gage's do not capture water/sediment data from others Searsville sources (Skipper's Pond Creek, Westridge Creek, other Corte Madera Creek drainage areas downstream from Westridge Bridge Gage. Alambique Creek Gage location is below Upper Searsville Marsh so is impacted, altering water quality and quantity and sediment transport from Alambique Creek upstream of the reservoir influence. Sausal/Dennis Martin gage does not differentiate between the two creeks and occurs downstream from their confluence and within Searsville Reservoir influence. These gage locations will lead to inconsistent data of tributary flows and sediment transport previously recommended to be "upstream from reservoir/sedimentation influence". Recommendation- Describe the above limitations in the report and conduct summer/fall surveys of Upper Alamabique Creek flows (upstream from the second upstream Portola Road crossing), describe conditions in Sausal and Dennis Martin immediately upstream from their confluence, and describe input from other non-captured streams and reaches described above. 3) So far, this has been an abnormally low rainfall year (despite the early high flow event of Dec. 24). We understand from our call that URS will describe findings in the context of this water year and where possible for analysis, utilize other existing Balance data to define low, moderate and high flow year conditions (ie Corte Madera Creek at Westridge, Searsville Dam outflow, etc.) and summarize existing water data parameters. 4) We request that all gages be equipped to collect water temperature, turbidity, DO, flow (high and base/summer flows to the 100th of a cfs) for comparison and coverage of input/output to and from Searsville Reservoir. 5) Figure 1 notes that flow measurements are to be taken at Corte Madera Creek on the sediment delta to assist with fish passage interpretation. We request that this effort also be carried out for sediment depositional areas on Alambique, Sausal, and Dennis Martin Creeks. We request that this effort and data be incorporated into our recommendation for expanding the fish passage study to include passage feasibility at these locations and to and from these tributaries. 6) We understand form our call that URS will be sending us a table/list of each watershed gage, location, and what parameters are being measured. 7) For the existing biological and facilities (recommended) conditions studies, interim measures, and system response efforts we request that URS studies

compile data and assess Searsville diversion impacts below the Searsville Booster Pump Station and sediment/reservoir water discharge along San Francisquito Creek approximately 2 miles downstream from the dam site. Currently, no gages or studies are identified to describe/assess this component of the Searsville operation and impact on existing biological conditions and other study scope tasks. 8) Water Budget- The described monitoring stations and studies do not provide enough data to develop a complete water budget for Searsville operations and watershed, an essential task to adequately describe existing conditions and to assess alternatives (such as interim flows measures, water diversion options, and system responses to alternatives). We recommend that the study scope be expanded to include development of a complete water budget that incorporates all Searsville water inputs and outputs including, but not limited to, all tributary inflow, dam spill, diversion amount and duration (seasonal and annual), reservoir evaporation (annual/seasonal rates and totals), estimated reservoir sediment vegetation transpiration (annual/seasonal rates and totals) and groundwater/spring input sources (using existing data and difference following above input/output amounts). It is particularly important for the interim measures and alternatives system response results that the critical summer/fall water budget and resulting flows downstream of the current dam location are defined and estimated for each alternative. We understand that much of this additional information has been studied by Stanford and already exists, for relatively easy incorporation into the current study scope.

Interim Measures Assessment
1) We recommend that this scope be expanded to assesses additional parameters impacting downstream flows and biological conditions. Reservoir evaporation, transpiration (reservoir sediment vegetation), groundwater/spring rates and annual totals must be included to accurately assess existing and potential future flows and surface water availability, biological conditions, interim flow measure options and alternative responses. 2) We recommend that fish habitat below Searsville on Corte Madera Creek be quantified (using DFW habitat survey protocol), not simply “observed”. The assessment and development of interim habitat measures must extend past Corte Madera Creek and down San Francisquito Creek to the Bay. 3) We recommended that the interim measures list include measures to address the Searsville Booster Pump Station’s described sediment discharge and reservoir water releases along San Francisquito Creek. We also recommend that the Stanford proposed Lagunita Dam removal and modification/bridging the JRBP instream road crossing on upper SF Creek be added to the interim measures list since Searsville releases, or lack of releases, impact fish passage effectiveness at these partial steelhead barriers. 4) Along with fellow Technical Study Subcommittee members Corinne G. (DFW), and Shani K. (SCVAS) we strongly recommend the addition of a critical riffle and ramping flow study to assess steelhead migration for interim and long-term alternatives consideration. These studies are critical downstream of the dam to adequately develop interim flow measures (i.e. to avoid entrapment) and for long-term alternatives assessment (i.e. for fish passage assessment and system response alternatives). Critical riffle surveys were also recommended by TSS members upstream of the reservoir across reservoir influenced sediment deposits to accurately assess fish passage options and system responses to alternatives.

Summary of Existing Biological Conditions
1) We recommend that the scope include URS collecting relevant Searsville and watershed data from TSS members. 2) The scope’s study area is currently limited to “just upstream of areas of

sediment depositions or influence by Searsville" to the Bay. This needs to be expanded to match the overall Searsville and Advisory Group agreed geographic study area. The AG agreed the study area includes the entire watershed and Bay wetlands near the creek mouth. The described geographic scope should to be expanded for certain species and sitautions to sufficiently determine System Response to alternatives (i.e. what is predicted with provided steelhead access to upstream habitat, how would listed species like red-legged frog, pond turtle, SF garter snake respond to no migration barrier or reservoir at Searsville and improved access to upstream habitat and connectivity with documented upstream populations, how would existing steelhead populations in Bear and Los Trancos Creek respond to actions that improved flow rates, water quality, renewed transport of habitat features (gravel/wood), and reduced/eliminated non-native species during their migration along the mainstem of SF Creek?) 3) We recommend that the study report differentiate between what open water and wetland habitats (and other habitat types) result from Searsville and what habitat occurred there before the dam and could remain there without Searsville or be restored. This is critical to accurately describe existing conditions and discuss system responses to various alternatives. This requires the addition of an historical ecology study we recommend and understand will be incorporated into Phase 1. 4) We recommend that existing habitat and water quality conditions in the reservoir/open water areas and upstream and downstream creek reaches be added, and differentiated between pre-dam and Searsville influenced conditions, and include: seasonal stream flow rates/duration/distribution, seasonal water quality in creeks and open water habitats (temp, DO, turbidity,) 5) We recommend the removal of the bat impact sentence which is inappropriate in this study scope document and shows a predetermine bias against alternatives other than status quo or no action. It is disappointing to see this language in a study scope document before analysis and without incorporating study findings and other scientific study findings related to bat response following other dam modification/removal and restoration sites. 6) We recommend that the study define and discuss to what extent Searsville has resulted in riparian woodlands within and around the former reservoir site and compare to the pre-dam extent of riparian woodlands in the area and quantity, independent of Searsville. Define/discuss how much of the existing riparian woodland habitat was already riparian woodland habitat pre-dam and potentially would still be with various alternatives. Define the amount of riparian and wetland habitat (and other types) that have been submerged or buried by Searsville Reservoir and sediment deposits. This critical task requires the historical ecology study recommended. 7) We recommend adding a discussion and summary of scientific findings/reports describing non-native species competition and predation impacts by reservoir species present in Searsville on native wildlife and what these findings mean for the existing biological conditions within Searsville/SF Creek watershed.

Dam Modification, Removal, and Hybrid Options (See Hybrid features below in System Response)
1) We recommend considering adding several Hybrid Options incorporating features of other alternatives into various combinations or as individual add-ons (flood protection, habitat restoration/protection, diversion/storage alternatives, fish passage, etc.) We believe hybrids need to be identified and evaluated before any individual element or alternative is rejected, and our understanding is that Stanford has committed to not eliminate any major alternative as a result of this first phase of work. 2) We recommend the inclusion of construction and operational cost estimates over a 50-year timeframe. We recommend that the study discuss and identify which alternatives are expected to be attractive for outside grant funding and how estimated costs may

be impacted (ie some alternatives would likely attract outside funding and grant sources and lower Stanford's costs, while some would likely attract no outside funding and rely exclusively on Stanford funding). 3) We recommend that dam modification and removal alternatives discuss and include likely habitat restoration efforts that would occur in conjunction with the alternatives (ie native planting and weeding, erosion measures, etc). 4) Four broad dam removal alternative concepts are listed in this scope, but only two alternatives are to be developed in the "System Response" section of this report. We recommend that at least four dam removal alternatives are developed per the scope's own description of four general dam removal strategies.

Sediment Removal Options (add Stabilization, Managed Transport, Phased Release)
1) The scope's listed activities do not address key sediment management issues and is unfairly focused on dredging studies that keep the dam in place. We understand from our call that URS agrees with this point and that Stanford will add sediment management options to this scope. 2) We recommend adding the following concepts for additional study: a. Identify likely sediment and vegetation stabilization locations and methods, particularly at upstream sediment depositional areas and desirable riparian woodland areas. b. Utilization of Lloyd's Pond (Upper Marsh) and Middle Reservoir area as open water/seasonal wetland areas, water storage and groundwater recharge basins, flood attenuation basins, and sediment settling basin(s) with the potential for occasional excavation/dredging and minimization of downstream sediment transport and peak flows. c. Determine managed sediment transport feasibility and options. Identify flow needs and potential for optimized and managed transport of some sediment to the Bay, minimizing channel aggradation, and partial sediment stabilization with optimal flow trigger releases.

Searsville Dam Fish Passage Options
1) As noted by several other TSS members the stated scope of work for fish passage analysis is inadequate. The scope does not address passage at the critical Searsville influenced sediment deposits and dense vegetation areas, altered upstream and downstream stream surface flow/duration, no essential critical riffle assessment (upstream and downstream), and inadequately describes using design flow calculations based on "existing conditions", which do not have downstream flow measures in place. Unlike other alternatives there are no cost estimates to allow a meaningful comparison with other alternatives. As TSS members requested, costs and fish passage alternative descriptions need to include construction and ongoing annual operational needs, including estimation of flows and water quality necessary for passage alternatives to function properly. We recommend, along with other TSS members that the fish passage analysis include passage across the reservoir (for both upstream and downstream timing), critical riffle studies upstream and downstream of the dam and reservoir, ramping flow study downstream of the dam, and passage at tributary sediment depositional areas and dense vegetation areas influenced by Searsville Reservoir and operations.

Upstream Model Development
1) We recommend that models to be developed include base flow conditions (rate, extent, duration) and relationship to reservoir influenced sediment deposits. 2) We recommend the assessment include a current estimate of reservoir influenced sediment deposition upstream of open water areas (extent and amount) and comparison with pre-dam channel profiles. 3) We recommend that the study differentiate between the "existing" sediment baseline and pre-dam

sediment baseline in order to compare alternatives and determine existing Searsville influenced sediment and channel configuration vs. pre-dam sediment and channel conditions.

4) We recommend that reservoir area flood attenuation models be developed to compare alternatives and resulting flood attenuation estimates. It is important that all alternatives and pre-dam conditions be assessed and compared for predicted/potential flood attenuation impact. The Historical Ecology Study should include, or this section should include, an historic hydraulic study to qualitatively determine pre-dam flood attenuation and conditions. This will enable assessment and comparison of the full range of alternatives. 5) Include review and discussion of SM County Liquefaction and Flooding maps and implications on upstream flooding, sediment, reservoir filling, and reservoir/dam safety (in section to address dam safety).

Downstream Sediment and Flood Assessment Approach

1) Include incorporation of existing SU and SM County flood inundation data results for dam failure assessments (Report sent to Tom Z. following our call). 2) We request that the described workshop include TSS members.

Water Diversion and Storage Options

1) We recommend that the Water Diversion and Storage Options study include development of non-stream diversion and non-reservoir storage options (groundwater, off-stream tanks, dual purpose wetlands) and alternative supply sources (wells, wastewater re-use, stormwater run-off) and reference or incorporate information developed by Stanford in other studies/programs to quantify non-potable water reduction and efficiency measures (less irrigated grass, more drought tolerant landscaping, more water efficiency measures). 2) We recommend that climate change and greenhouse gas emissions impacts be determined for each alternative developed in Phase 2. We recommend that existing study findings on greenhouse gas emissions from reservoirs and reservoir sediment transport impacts on coastal wetlands and sea-level-rise be incorporated in this section and alternative system response section.

System Response Studies 1) As noted earlier, we recommend that this section differentiate between existing conditions and historic conditions and define what conditions are Searsville Reservoir influenced vs. what conditions occurred pre-dam or might occur with no dam or modified dam alternatives. As noted earlier, we recommend that a complete fish passage assessment be conducted and that climate change and dam safety studies be added to adequately assess future biological, flooding, and other conditions with each alternative.

Potential Future Action-

No Action

a) Near future- We strongly recommend that downstream biological impacts be added to this section. The scope inaccurately states that no action “impacts similar to existing”. As is detailed in the previous NHC and other reports, downstream conditions are changing rapidly as each high flow event reduces the size and sediment trapping efficiency of the reservoir with major changes to downstream turbidity, suspended sediment quantity, rate of non-native species transport over the dam, and other more.

b) Far Future We recommend that the “Far-future” horizon be quantified.

Reservoir Storage Recovery Options

1) As noted earlier, we recommend adding the assessment of storage recovery options for Middle Reservoir area (upstream of Causeway) and Upper Marsh individually and together with the Main Reservoir absent. 2) We recommend a table with side-by-side comparison of water volume outcomes from this section to the previous section results (Water Diversion, Storage) and long-term sediment management needs.

Reservoir Water Surface Modification Options
1) We recommend that this section include the above mentioned additional storage recovery options and incorporation of flood protection features from managing the surface elevations of these open water areas to maximize flood protection benefits.

Dam and Sediment Removal Options
1) As noted earlier, we recommend that at least 4 dam removal alternatives be developed as identified on page 8. "The potential range of removal options may include full depth or partial depth notching of the crest, partial lowering of the entire crest, and complete removal of the entire dam structure." We recommend and understand this above statement to recognize the temporal options within these alternatives, such as phased notching or full crest lowering over multiple years (ie 2,3,5 etc.) and the variable outcomes of these different construction duration options. 2) We recommend that the above alternatives include consideration of varying volumes/areas of sediment/vegetation stabilization and varying managed levels of sediment transport or managed release during determined optimal flow events to maximize sediment transport to the Bay and minimize aggradation downstream. Models exist to assess these optimal flows and sediment transport characteristics (ie DREAM model)

Hybrid Options (Add)
We understood for our call that URS agreed that Hybrid Alternatives are likely to be considered as preferred alternatives due to their incorporation of multiple features with multiple benefits and that modifying the scope to add several of the promising Hybrids would not be difficult. We strongly recommend that several Hybrid Alternatives be developed in Phase 1 and include combinations of dam/reservoir modification and removal alternatives with the following, and potentially other, design features: 1) Stabilization of varying amounts of the upstream reservoir sediment deposits and woodlands 2) Maintain some/all of Lloyd's Pond (Upper Marsh) with design features to maximize wetland habitat quality, flood attenuation, and/or sediment trapping/disposal. 3) Maintain/restore some/all of the Middle Reservoir area to open water or seasonal wetland with design features to promote wetland habitat, flood attenuation, and/or sediment trapping/disposal. 4) Full dam removal with complete or partial sediment removal and reservoir area design that maximizes natural flood attenuation features, groundwater recharge, seasonal and permanent open water, and native habitat features. 5) Modification or removal of the dam with construction of an aerial bridge and central research platform across the crest location to maintain trail access and enable enhanced/ongoing research function.

Analyzing System Response-
1) Upstream Biological Response- We recommend that this section compare the amount and extent of stream habitat, riparian woodland and other habitat types, open water, for all alternatives and known pre-dam conditions. This section must be able to utilize the recommended Historical Ecology study. The section should assess and discuss shortterm and

long-term biological impacts and outcomes. We recommend that the response assessment identify and include likely restoration measures needed (ie native vegetation planting, non-native veg removal, erosion prevention) and long-term outcome predictions utilizing other dam filling/modification/removal project result findings. It is essential that certain alternatives with limited differences between short-term and longterm outcomes (ie status quo) be compared over the short-term and long term with other alternatives that have very different outcomes immediately following implementation and decades later (ie dam removal). 2) Downstream Biological Response- As above, we recommend that this section assess short-term and long-term biological impacts and outcomes.

Add Steelhead Monitoring Program and Lagunita Dam Removal Study
Stanford's Dec. 6, 2012 letter to NMFS states: "In addition, during the suspension period Stanford remains committed to continued steelhead conservation in San Francisquito Creek, such as steelhead monitoring activities and other interim measures and studies that are being developed through the Searsville Alternatives Study process. Likewise, Stanford will continue to evaluate possible creek enhancement actions, such as removing the non-operating Lagunita diversion dam along with its fish ladders. These actions will help inform future decisions in the San Francisquito/Los Trancos Basin."

We recommend that the steelhead monitoring study be developed with the TSS and wildlife resource agencies and include: - Adult steelhead migration (occurrence, upstream and downstream migration timing and flows, at lower SF Creek and CM Creek locations) - Fish passage effectiveness and flow requirements/limitations at Lagunita Dam and JRBP crossing, related to interim flows and ramping at dam (early winter and late spring).

We recommend development of a timeline and studies for the described Lagunita Dam removal.

Add Historical Ecology Study (Phase 1 except last bullet Phase 2)
- Detailed (pre-dam assessment and data compilation) outlining extent, amount, and type of different habitat types and species documentation. - Effort should include a detailed historical mapping effort and products describing the Searsville area habitats pre-dam. - Utilize a methods to allow comparison of historic vs. existing quantity and distribution of habitat types (grasslands, riparian woodlands, stream distance, wetland extent, open water, etc.). -Enable future use of this model to overlay alternatives (Phase 2) to determine system responses and changes in amount and extent of habitat types immediately following implementation and long-term.

Add Impact on Climate Change to System Response Section (Phase 2)-
- Assessment of climate change implications for alternatives (50-yrs+) - GG emissions, carbon equivalent, carbon capture, oxidization - Sediment transport, Bay wetlands, and Sea-Level Rise - Changes to stream water temps, flows, wildlife migration and adaptation

Add Dam Safety to System Response Section-
Completion of DSOD recommended (2007) footing/geology inspection with DSOD and Geologist (Phase 1) - Present existing Emergency Action Plan (Phase 1) or summarize key components needed for alternatives in Phase 2 - Determine structural condition and identify safety issues (seismic and non-seismic) at present and into the near future - Conduct a current

study to determine the integrity of the dam's adjacent geology (Phase 1) - Conduct a study to determine spillway/outlet capacity adequacy, blockage hazards, present and future dam face wear and compliance with DSOD regulations. (Phase 2)

Economic Analysis of Alternatives added to each alternative (Phase 2)
Construction, operational/maintenance, sediment management (50-yrs+) - Grant/funding potential for each alternative

Add a discussion of potential liabilities with each alternative (Phase 2)
- Associated with each alternative (50 yr+ timeframe)

Additional General Recommendations
3) TSS review and comment on draft URS report(s) 4) Summary and easily understandable table that compares responses to historic/existing/alternatives (ie extent of open water, extent of riparian forest, extent of stream mileage, construction and ongoing costs, flood attenuation, sediment stabilization/removal/transport, ongoing maintenance needs, safety, etc.) 5) Assess and discuss outcomes of JPA, CalTrans, and other flood protection measures being implemented and proposed within study areas and system response implications for alternatives. 6) As with the first paragraph, please use the term "Reservoir" throughout this document and future reports instead of "Lake", which is inconsistently and incorrectly used on occasion.

Attachment D: September 21, 2015 email to Permitting Agencies re: Searsville Dam Alternatives, Data Gaps, and Information Requests

From: Beyond Searsville Dam Subject: Searsville Alternatives Data Gaps and Requests Date: September 21, 2015 3:18:54 PM PDT To: Brian Cluer <Brian.Cluer@noaa.gov> Amanda

Morrison <Amanda.Morrison@noaa.gov> Gary Stern <gary.stern@noaa.gov> Corinne Gray <Corinne.Gray@wildlife.ca.gov> Scott Wilson <Scott.Wilson@wildlife.ca.gov>, AL.Riley <AL.Riley@waterboards.ca.gov> Setenay Frucht <Setenay.Frucht@waterboards.ca.gov>, Marcin Whitman <MWhitman@dfg.ca.gov>

Hello all,
We understand that Stanford will be meeting with resource agencies this week to discuss alternatives for Searsville Dam. We are glad to see this issue moving towards a more thorough and transparent public review process that incorporates your expertise. For many of us involved in Stanford's Searsville Advisory Group, the lack of study transparency and limited alternatives analysis was frustrating. Similarly, Stanford's selection of two preferred alternatives that were not supported by the majority of AG members and which seemingly failed to commit to adequately studying the largely supported dam removal alternative was disappointing. Fortunately, folks on the AG that were experienced with dam removal and modification projects supported dam removal as the preferred alternative (including the Water Board's excellent letter). Additionally, the coming permitting process requires that this "reasonable alternative" be adequately assessed and considered by your agencies and for public consideration. We look forward to working with you to ensure that Stanford provides previously withheld data and carries out additional studies needed. We offer our help in ensuring a thorough level of assessment and comparison between their preferred alternatives and the dam removal alternative supported by multiple agency staff and watershed stakeholders.
Below are a few of the key issues, data gaps, and needed assessments we have identified and which we request you ensure Stanford provide publicly. Many of these were requested of Stanford during the AG process but were not carried out or disclosed to us: Dam Removal Flood Attenuation Data and Analysis AG members noted, and Stanford consultants acknowledged, that a level of enhanced flood protection provided with Dam Removal Alternative 8b could be equal to and even exceed the highest flood protection benefit determined for all other alternatives. This enhanced 8b could include enhanced flood storage capability at Middle Reservoir and Upper Marsh areas, within the reservoir's restoration and floodplain area, and at one or more off-stream basin storage areas (at Beothing and potentially other locations). It is critical that the flood attenuation performance of one or more "enhanced" dam removal options be determined and compared to Stanford's preferred alternatives as it can provide superior downstream (and current upstream) flood protection and public safety. Such an enhanced dam removal option would also eliminate future dam failure risks associated with the two preferred alternatives. Dam Deconstruction and Sediment Management Options Not Evaluated AG members expressed deep concern and frustration that the consultants only evaluated a single phased dam removal approach with removal and trucking/disposal of all accumulated sediment for dam removal options. This ignores multiple, earlier AG requests, to assess multi-phase dam removal / incremental notching as well as determining the maximum amount of accumulated sediment stabilization on site and safe transport of fine sediment downstream during flushing flows to sediment deprived Bay wetlands. It is critical that realistic and accurate sediment management options be carried out for dam removal and other alternatives.

Climate Change Evaluation of important climate change issues have not been assessed to date; total remaining reservoir area greenhouse gas emissions (CH4, CO2, others), carbon capture equivalent of reservoir area vegetation restoration, exacerbated reservoir and downstream water quality projections with climate change, exacerbated reservoir area evaporation rates and downstream flow impacts with climate change projections, SF Bay wetland sediment needs and sea-level-rise projections, dam/reservoir exacerbating wildlife migration corridor limitations for sensitive species, reservoir exacerbated non-native species expansion, and species adaptation limitations caused by physical, thermal, and biological impediments associated with a dam, fish ladder, fishway, or baffled orifice versus a restored channel and dam removal alternative. Downstream Water Availability and Quality AG members were extremely frustrated that no data or assessment was provided out on how alternatives would impact stream flow quantity and quality within and downstream of the reservoir and dam site.

We request that this information be developed for dam removal and other alternative studies moving forward. It is critical to know how water quality and quantity differs between these alternatives over time and with maintenance requirements or naturally restored conditions. For example, operating the dam as a flood control basin will impose both short and long-term siltation events downstream as water and sediment are captured, stored, and mobilized from the reservoir. Dam removal would not be expected to experience such chronic and long-term siltation and turbidity issues.

“Baseline” Conditions and Alternatives “Effects” Stanford has incorrectly considered the current dam/reservoir as being the “baseline” environmental conditions and with “0” “effect”, while restoring the area to its more natural “baseline” conditions has the largest “effect”. We request that resource agencies properly consider the current, actively managed and altered conditions as being “effected” by the dam, reservoir, and annual maintenance activities (such as annual sediment flushing, diversion modifications, reservoir clearing, etc.).

Biological Data and Alternatives Comparison Analysis Needs Alternative that would include an orifice in the dam · Requires highly engineered fish passage facilities within the bottom of 50-foot long orifice and highly engineered upstream and downstream creek channel structures. Fish passage features required within the orifice and at the inlet would catch significant debris, trap sediment in the reservoir area precluding restoration and require ongoing removal, elevate flood and dam failure risk, and block fish migration during debris blockage/clearing (which occurs during migration flows). · Results in massive, chronic fine sediment discharge downstream during and following high flows and sediment trapping and removal. (See below mentioned NOAA Jeopardy Decision for Santa Barbara County flood control dams with similar orifice feature) · Requires extensively engineered channel creation and energy dissipation features in the downstream channel to prevent scour from the high discharge velocity from the orifice. These features compromise listed Critical Habitat and fish passage. · Most disruptive, ongoing, and restoration averse alternative for the watershed and JRBP. What are the 50 year implications? · Despite constant requests during the AG process, consultants never presented an example of a similar, recently permitted orifice-type flood retention facility that discharges periodically accumulated sediment into listed Critical Habitat for steelhead, and effectively passes fish. · Recent NMFS Jeopardy Decision against Santa Barbara County orifice type dams details the numerous problematic legal/ESA issues associated with such a facility.
· Unknown safety issues associated with the modified dam’s structural stability, dam loading associated with rapid flood control filling and emptying, debris blockage and overtopping/scour

issues, reservoir induced seismicity, and adjacent San Andreas Fault activity. · Many problematic fish passage issues associated with the orifice option have not been evaluated: 1) passage conditions within the orifice (length, slope, darkness, attraction flows, downstream scour and jump height), 2) migration flow window, 3) downstream grade control structures and hydraulic stability, 4) inlet debris blockage and removal during migration flows, 5) flood basin storage, discharge plan, and trapping/stranding of outmigrating steelhead, 6) reservoir and downstream water quality and turbidity impacts from operations, 7) upstream migration issues during reservoir drawdown operations and upstream attraction flow issues, 8) postflood reservoir sediment/debris removal, disposal, and duration of turbidity downstream and within reservoir area and impact on fish migration delays, water quality, and spawning/egg incubation downstream.

Alternative that would use a fish bypass channel · Bypass channels have gradient limitations and a footprint that would require massive earth moving of upland habitat and disruption to natural areas and potentially cultural sites. · Roughened channels require much more water to function than fish ladders and experts have acknowledged that this problem, and water limitations at Searsville, likely render this option infeasible. · Roughened channels, especially the “nature-like” type would require constant monitoring and maintenance by Stanford and agencies to ensure adequate fish passage criteria and flows were maintained. · As with ladders, there are significant fish attraction issues at both outlet and inlet locations. Alternative that would retain all/part of Searsville Reservoir complex (open water) · Lethal water quality conditions in the reservoir based on temperature, dissolved oxygen. · Predation of steelhead (and other species) that must migrate through
the open water reservoir harboring non-native predatory species. · Ongoing dispersal of non-natives downstream and upstream · Ongoing, documented elevation of downstream turbidity duration and water quality problems caused by the reservoir. · Ongoing depletion of beneficial downstream sediments and woody debris · Ongoing evaporation of reservoir water and reduction in downstream flow and diversion availability · Not supported by regulatory agencies, who have not even seen the data on other problematic issues besides upstream fish passage (ie reservoir migration/predation /entrapment, delta subsurface flows, thick delta vegetation, etc.) · Permitting feasibility and turbidity issues (plus methane release) associated with ongoing dredging and channel clearing operations. · Additional lands flooded and/or reservoir elevation change problems for steelhead migration and methane emissions. · Ongoing dam safety liability and retrofitting / replacement costs moving forward.

Alternative that would use a fish ladder
· AG members overwhelmingly opposed a fish ladder for this project. · Do not function properly in a highly flashy system such as San Francisquito. High flow blockage and hydraulics, inadequate low flow quantities to operate. · Exhaust the fish right before they face predators in any remaining reservoir area, reducing open water success rates. · Do not pass all types or life stages of fish and ignore other aquatic wildlife migration needs. · Require significant maintenance and debris removal. Stanford has had ongoing problems and received complaints about the lack of suitable fish ladder maintenance at their Lagunita and Felt fish ladders. They have a poor track record of fish ladder maintenance. · There are significant fish attraction flow issues at both outlet and inlet. · Experts acknowledged the problem with a fluctuating reservoir elevation. We noted that the reservoir elevation is recorded to change as much as 12

feet or more in DSOD survey documents, far more than URS said was feasible with a fish ladder. · If the dam is lowered or reservoir is allowed to fill in with sediment, there are other fish ladder inlet problems associated with braided channels across the reservoir area, accumulated sediment elevation changes, and subsurface flows within the accumulated reservoir sediment.

Dam removal benefits not yet fully assessed or compared to other alterntaives · Provides the most effective, and proven passage conditions for all life phases of steelhead over the broadest range of flows. · Only alternative that provides unimpeded migration connectivity for all other native fish and wildlife species. · Only alternatives that can eliminate ongoing steelhead (and other species) litigation, regulatory oversight, and ongoing "take" mitigation measures. · Does not require complex, and likely unfeasible, fish passage facility flows to facilitate upstream and downstream passage and habitat conditions. · Eliminates water evaporation from the main reservoir, enabling more creek flows within and downstream of the reservoir area. · Eliminates documented and elevated turbidity duration downstream due to the reservoir. Prevents ongoing flood control alternative (orifice) turbidity. · Only alternative that can achieve a long-term, self-sustaining, and effective fish population and other wildlife passage, flow, and water quality solutions. · Enables resumption of unimpeded beneficial sediments and woody debris to degraded downstream habitats and Bay wetlands (with problematic coarse material removed and/or stabilized and flood protection measures already in place). · Most effective way to eliminate non-native species and harmful vector control spraying practices at the reservoir. · Only alternatives that result in miles of newly restored stream, floodplain, and wetland forest habitat within the reservoir area. · Supported by Regional Water Quality Control Board and preferred fish passage alternative for NMFS and CDFW per agency fish passage guidelines.

Thank you for considering these additional data and assessment needs as you consult with Stanford. Please let me know if there is anything we can provide or do to help you move an effective Searsville Dam solution forward.

- Matt Stoecker

Attachment E: March 30, 2015 Letter from the San Francisco Bay Regional Water Quality Control Board to Stanford University

March 30, 2015

Ms. Jean McCown Steering Committee Co-Chair
Searsville Dam Alternatives
Government and Community Relations, Stanford University
450 Serra Mall, Building 170, First Floor
Stanford, CA 94305-2040

Dear Ms. McCown:

The San Francisco Bay Water Board greatly appreciates the initiative by Stanford University to sponsor the Searsville Dam Advisory Group to consider alternative management strategies for the Searsville reservoir. The Water Board intends to remain engaged in this issue by participating in a coordinated review of project alternatives with other responsible federal and State resource agencies as project planning enters into the regulatory process, including preparation of federal and State permits and development of an environmental impact report under the California Environmental Quality Act (CEQA).

The Water Board has broad regulatory authority, as described in the San Francisco Bay Basin Water Quality Control Plan (Basin Plan), relating to the protection and restoration of water quality and the beneficial uses of San Francisquito Creek, including cold freshwater habitat, spawning, fish migration, and rare and endangered species habitat. As stated in the Basin Plan, "Protecting beneficial uses within the Region consistent with the federal Clean Water Act and the Porter-Cologne Act requires careful consideration of projects that result in hydrogeomorphic changes and related adverse impacts to the water quality and beneficial uses of waters of the State." In our role as a responsible agency under CEQA and our role as the State's water quality permitting agency, we will want to be able to review an assessment of the management alternatives, and their influence on natural physical processes and related water quality and habitat conditions, to determine the environmentally-superior alternative.

In addition, San Francisquito Creek and its tributaries are federally-listed as impaired by sedimentation. The mainstem of San Francisquito Creek downstream of Searsville Dam is a deeply incised channel, its habitat is greatly simplified, and the channel is largely decoupled from its floodplain and tidal marsh. The dam contributes to these impairments by creating an imbalance in coarse and fine sediment supply to the downstream reach and also by causing the processes of sediment transport and deposition to be substantially altered. Up until recent decades, Searsville Lake was a complete trap for all of the coarse sediment (gravel and sand) and much of the fine sediment delivered from upstream areas. The dam also remains a complete barrier to steelhead migration, greatly reducing the amount of habitat that is accessible, and placing this steelhead population at much greater risk of extinction.

To address the impairment, the federal Clean Water Act mandates that a "Total Maximum Daily Load" be developed by the Water Board to ensure that San Francisquito Creek is restored and the sediment impairment is removed. We expect that the TMDL and its associated implementation plan for San Francisquito Creek will need to take a holistic approach to implementation, one that emphasizes achieving balanced coarse and fine sediment supplies throughout the watershed, and includes actions to enhance habitat complexity and connectivity in upstream and downstream channel reaches. Consistent with these goals, we support alternatives for the management of

Searsville Dam that would restore natural sediment supply and transport to downstream channel reaches, floodplains, and tidal marshes, while also restoring anadromous fish migration to and from the upper watershed. Staff representing the Water Board on the Searsville Dam Advisory Group has emphasized the benefits of sediment continuity between upstream and downstream reaches, natural transport and deposition processes, and the importance of restoring anadromous fish migration. Marsh and floodplains downstream of Highway 101, including the Faber Marsh, ultimately will benefit in the long-term from restored fine and coarse sediment supply and transport, particularly given the need for our Bay marshes to be nourished by sediment in order to be resilient to sea-level rise.

We would like to provide some initial input to the Searsville Dam Advisory Group and Stanford University about our perspective on these matters as alternatives are being considered. We have been, and continue to be, supportive of alternatives that focus on dam removal. We are supportive of giving consideration to sluicing sediment from the dam in lieu of, or in connection with, sediment excavation from the reservoir. On the other hand, we think there will be performance issues associated with the application of fish ladders and operations of orifices in dams to mitigate for fish passage barriers and are concerned about the technical feasibility of constructing bypass channels around the dam.

We look forward to working with you in the future on this important project and would welcome you to come to the Water Board to provide a detailed briefing on the management alternatives under consideration. Please contact my staff, Ann L. Riley at AL.Riley@waterboards.ca.gov, if you have any questions.

Sincerely,

Bruce H. Wolfe
Executive Officer

cc: Gary Stern, NOAA Fisheries: Gary.Stern@NOAA.gov Scott Wilson, Bay Delta Region, California Department of Fish and Wildlife: Scott.Wilson@wildlife.ca.gov Kelsy Rugani, Facilitation Team, Searsville Dam Advisory Group: Krugani@kearnwest.com

-------- Original Message --------
Subject: Revised comment letter on SFCJPA DEIR - San Francisquito Creek Upstream of Hwy 101
From: Patrick Samuel <psamuel@caltrout.org>
Date: Thu, June 20, 2019 2:21 pm
To: "comments@sfcjpa.org" <comments@sfcjpa.org>
Cc: Matt Stoecker <mattstoecker@mac.com>, Eric Wesselman <Eric@friendsoftheriver.org>, "len@sfcjpa.org" <len@sfcjpa.org>, "kmurray@sfcjpa.org" <kmurray@sfcjpa.org>

Good afternoon Len,

Please find attached an *updated* joint comment letter on the draft EIR for the San Francisquito Creek Project Upstream of Highway 101 from Beyond Searsville Dam, California Trout, and Friends of the River. **The substance of this revised letter is identical to our prior submission, but this version corrects an oversight by including Eric Wesselman's e-signature.** O3-1

Thank you for your careful consideration of these comments. We look forward to working with you on this.

Sincerely,

Patrick Samuel
Bay Area Program Manager
California Trout

June 18 2019

Gary Kremen
Chair, Board of Directors
San Francisquito Creek Joint Powers Authority
615 B Menlo Avenue
Menlo Park, CA 94025
comments@sfcjpa.org

RE: Comments on the Draft Environmental Impact Report for the San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Dear Mr. Kremen,

We are writing to express our shared concerns over aspects of the draft Environmental Impact Report (DEIR) for the Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101 project (Project) prepared by the San Francisquito Creek Joint Powers Authority (SFCJPA) relating to completeness, environmental impact, cumulative impacts, and coordination with major partners on planned projects in the watershed before a preferred alternative is selected.

Friends of the River, Beyond Searsville Dam, and California Trout have been engaged in the San Francisquito Creek watershed for years and have worked to balance the needs of wild fish and people. We are eager to see ecological function restored in this critical watershed for federally threatened Central California Coast Distinct Population Segment (CCC DPS) steelhead (*Oncorhynchus mykiss irideus*). **O3-2**

The San Francisquito Creek watershed is home to federally threatened Central California Coast Distinct Population Segment (CCC DPS) steelhead (*Oncorhynchus mykiss irideus*) (79 FR 20802)[1] and once likely supported Central California Coast Evolutionary Significant Unit (CCC ESU) coho salmon (*Oncorhynchus kisutch*) as well.[2] Steelhead once inhabited the San Francisquito Creek watershed in significant numbers prior to the construction of dams, significant urban development, alteration of the channel in the lower watershed, and other development. San Francisquito Creek is considered an "anchor watershed" by the Center for Ecological Restoration and Management and supports an independent population necessary for the recovery and eventual de-listing of the DPS by the National Marine Fisheries Service.[3, 4] Under the latest statewide assessment of

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[1] *Federal Register*. April 14, 2014. Vol. 79(71).

[2] Center for Ecological Management and Restoration (CEMAR). 2005. Historical Status of Coho Salmon in Streams of the Urbanized San Francisco Estuary, California. 36pp. http://www.cemar.org/pdf/coho.pdf.

[3] CEMAR. 2007. San Francisco Estuary Watersheds Evaluation: Identifying Promising Locations for Steelhead Restoration in Tributaries of the San Francisco Estuary. 93pp. http://www.cemar.org/SFEWE/Full%20report.pdf.

[4] National Marine Fisheries Service. 2016. Coastal Multispecies Recovery Plan. National Marine Fisheries Service, West Coast Region, Santa Rosa, California. https://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/north_central_california_coast/Final%20Materials/Vol%20IV/coastal_san_francisco_bay_diversity_stratum.pdf.

steelhead status in California, CCC steelhead were found to be at risk of extinction in the next century if current threats and trends persist.[5] **O3-2 Con't**

The proposed SFCJPA Project is intended to ameliorate flood risk to human life and property while minimizing negative impacts to biological resources, yet we have concerns that the alternatives described will have negative impacts on habitat for native fishes including CCC steelhead that are not adequately addressed in the DEIR. We are also concerned that several key pieces of information are missing from this DEIR that were raised to SFCJPA, Stanford University, permitting agencies, and others through the Searsville Advisory Group back in 2015, including an emergency contingency plan in the event of Searsville Dam failure (CalOES approved Emergency Action Plan), dam removal flood attenuation and sediment study modeling results, and climate change impacts discussion that render this incomplete. We provide these comments to improve the revised Environmental Impact Report and to inform selection of a durable preferred Project alternative that is compatible with upstream changes to Searsville Dam and its future operation, considers future stream and sediment conditions under a changing climate, restores ecological function where practicable to reduce maintenance and intervention needs, and avoids significant impacts to native fish and riparian habitat. We request that comments and requests made in the attached documents, and previous made directly to the SFCJPA as part of the Searsville Work Group, be considered as comments and requests for this DEIS as well. The revised EIS should provide information and analyses that adequately address these outstanding issues with referenced studies or documents that will be part of the public record and draft in the final version. **O3-3**

1) The current analysis of alternatives is only for current conditions, and ignores future sediment, streamflow, and precipitation conditions in the watershed. There is no discussion of Searsville Dam in the DEIR. Success or failure of any project in these reaches depends upon being compatible with whatever decision is made regarding Searsville Dam and the considerable sediment stored behind it that is likely to be released and accumulate in proposed Project sites. Further, selection of a preferred alternative in the absence of a public document discussing details of what will occur on Stanford property is premature and imprudent; it would preclude serious and good-faith consideration by Stanford of all possible options regarding the dam and may eliminate potential options for various solutions to the fish passage and flood retention issues associated with Searsville Dam and Reservoir. Finally, an assessment of proposed Project alternatives must be assessed in a scenario of dam failure, the details of which are outlined in an internal Stanford University report (Attachment A: November 5, 2012 letter to California Department of Water Resources Division of Safety of Dams). **O3-4**
2) The Cumulative Impacts section of the DEIR is lacking in its completeness and consideration of likely future projects in the watershed, including regarding Searsville Dam as discussed above, and the cumulative impacts they would have on the watershed from proposed construction and maintenance activities. **O3-5**
3) The identification of alternatives has missed an important option that had been raised with Stanford University in Searsville Dam Advisory Group meetings in 2015 to deal with fish passage at Searsville Dam: utilizing the natural topography of the historical **O3-6**

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[5] Moyle, P., R. Lusardi, P. Samuel, and J. Katz. 2017. State of the Salmonids: Status of California's Emblematic Fishes 2017. Center for Watershed Sciences, University of California, Davis and California Trout, San Francisco, CA. 579 pp. https://watershed.ucdavis.edu/files/content/news/SOS%20II_Final.pdf.

willow sausal habitat upstream of present-day Searsville Reservoir in the upper marsh for flood attenuation and enhancement of fish rearing habitat. Modifying the mouths of Alambique, Corte Madera, Dennis Martin, and Sausal creeks and exploring creation of additional offstream detention basins nearby through dredging, replacing undersized culverts at Old La Honda Road, Portola Road, and Montecito Road and floodplain restoration should be analyzed to complete the realm of opportunities available if eminent domain were in fact to be used to seize Stanford University or other private property (Attachment B: May 5, 2015 email to SFCJPA; Attachment C: April 11, 2013 Searsville Initial Technical Studies Review and Recommendations letter; Attachment D: September 21, 2015 email to Permitting Agencies re: Searsville Dam Alternatives, Data Gaps, and Information Requests). **O3-6 Con't**

4) There is almost no mention of the potential impacts of sea level rise on potential Project alternatives which renders the DEIR incomplete. Similarly, alternatives should be viewed with their potential to disrupt and impact sediment delivery to San Francisco Bay and its eroding baylands, since any project work will have downstream impacts not only on San Francisquito Creek but also in surrounding bay habitats. **O3-7**

We also have specific comments on portions of the impact assessment that are incomplete or lack sufficient detail to determine potential impacts to native fishes, in order: **O3-8**

- "The Channel Widening Alternative and Flood Walls Alternative, Former Nursery Detention Basin Alternative and Webb Ranch Detention Basin Alternative are less than significant with mitigation or less than significant in the table". pg. 3.3-76

We disagree with this assessment, as any channel work that removes structure or habitat complexity for fish as part of construction or maintenance removes slow water refuge which is favored habitat for steelhead.

- "However, steelhead would be protected during construction by implementing MM-BIO-14, MM-BIO-15, MM-BIO-16, and MM-BIO-17. These include restricting construction to the dry season, decreasing pile driving noise, evaluating the stream and native aquatic vertebrates to determine if they are present, and relocating individuals as appropriate. Further, implementation of MM-BIO-6 would inform workers on how to identify steelhead. Implementation of all these mitigation measures will reduce impacts to a less-than significant level." pg. 3.3-77

Avoiding fish with seasonal construction does not lead to less than significant habitat impacts necessarily, yet this logic is a theme throughout the DEIR analysis. Placement of structures and the associated channel work such as rock slope protections, installation of piles at Pope-Chaucer Bridge, channel widening that alters the stream channel, and riparian vegetation removal all have the potential to degrade substrate and habitat for fish once it is wetted again. Removing riparian vegetation reduces shading that cools streams, overhead cover from predators, introduces terrestrial food sources, and eliminates future sources of large woody debris that are critical to create habitat complexity, scour pools, and velocity refuge for juvenile steelhead that are lost for the duration while newly-planted riparian vegetation takes its time to grow to maturity.

- "Aquatic habitat enhancement areas will be installed in the form of "three pool/riffle features along the restored channel at Pope-Chaucer Bridge and six velocity refuge features along widened reaches (rootwad or rock spur)." Pg. 3.3-83

There is a lack of design details that allow analysis of proposed habitat benefits from these structures under a variety of streamflows. The instream habitat improvements mentioned are not being considered for each location where large woody debris and potential sources of it (through riparian vegetation removal) is being removed in construction/maintenance, which we believe is an important oversight for mitigating unavoidable significant impacts. There is insufficient evidence to conclude that such work would result in a net benefit for habitat for native fishes and as such should not be used to justify selection of this project alternative component. **O3-8 Con't**

- "Floodwalls would be constructed along the channel continuously and have greater potential for disturbance along the bank and instream channel." 3.3-84

How will the floodwall construction impacts be mitigated? Creating floodwalls will increase the velocity of the water moving through these portions of stream, increasing potential for scour and downcutting, reducing buildup of suitable substrate to support benthic macroinvertebrates and native fishes, and reducing habitat suitability. Once this is done along the banks, any instream structures to benefit fish are less likely to persist as a result of velocity increases and elimination of other potential options at the site that will be foregone to put in the concrete floodwalls.

- Former Nursery Detention Basin Alternative/Webb Ranch Detention Basin Alternative "Construction of the detention basins is not likely to have any direct impacts on San Francisquito Creek or steelhead. However, construction of a weir in San Francisquito Creek could cause sedimentation and contaminant releases into the creek, which can be harmful to steelhead. Spawning habitat is available in Reach 3, and excessive sedimentation can smother eggs. Water quality protection environmental commitments would be implemented and protect water quality. If cofferdams need to be constructed to divert flow, however, fish could become stranded. Implementation of MM-BIO-14 would restrict construction to the dry season, and MM-BIO-17 would relocate fish if surface water is present. These mitigation measures would reduce this impact to less than significant." 3.3-85 **O3-9**

How will impingement and or stranding be avoided in detention basins? Is there a way they could be designed to incorporate volitional access and egress for fishes to allow them to take advantage of the velocity refuge and feeding opportunities that floodplain habitats afford? Such habitats can be valuable to juvenile salmonids, especially in urbanized watersheds where velocity refuge and off-channel pond habitat is in short supply and should be designed to encourage periodic and volitional habitat usage as an important life history strategy.

- "Further, ongoing maintenance would be performed through adherence to project environmental commitments. There would be no new impact." 3.3-86

Ongoing maintenance associated with project work in the channel has the potential to significantly impact steelhead, especially if large woody debris is moved or removed and sedimentation is exacerbated where the work occurs as described above.

- "Two known projects will occur in the same area as the proposed project during the same time period: the Newell Road Bridge Replacement Project (Newell project) and the Searsville Dam Removal Project (Searsville project). The Newell project should be starting within the next year, and the Searsville project is still under discussion. The Newell project will replace the existing bridge and widen the creek channel under and downstream **O3-10** of the bridge. The proposed project and the Newell project will both remove riparian vegetation in order to facilitate the new bridges and also around the bridges to widen San Francisquito Creek channel. Both of these projects are required to replant any riparian vegetation and trees that they remove. Native vegetation will replace nonnative riparian and trees. This will be beneficial to steelhead. No negative cumulative impacts on biological resources are expected from the proposed project.

- The Searsville project would affect the creek downstream of the dam. Sedimentation release from behind the dam could negatively affect aquatic resources by decreasing water quality and aquatic habitat by filling in pool habitat. This project will include the appropriate mitigation for the impacts it has on aquatic resources. The proposed project would not release sedimentation into San Francisquito Creek, and no negative cumulative impacts on biological resources are expected... The project would therefore not make a cumulatively considerable contribution to a cumulative impact." Pg. 3.3-102

This inadequate and incomplete section represents the biggest concern we have with the current DEIR. This Project is not being proposed in a vacuum, but it is being treated as such in the document. There is a lack of coordination among SFCJPA and Stanford on Searsville evident in this minimal description quoted above, whose "Searsville Dam Removal Project" will necessarily release large amounts of sediment downstream that will undoubtedly have cumulative impacts on communities downstream and biological resources that must be explicitly accounted for in this planning phase. It is unacceptable not to consider planned project work in the watershed by a major partner that will fundamentally determine success or failure of the current Project proposal. The major in-channel work must be able to pass flood waters and flows, yet SFCJPA seems to have not considered one of the major sources of sediment into the creek that is likely to occur in the foreseeable future and during the lifespan of the Project. **O3-10 Con't**

It is premature and imprudent to select a preferred alternative on this Project without having a clear answer as to what will happen with Searsville Dam. The dam holds back considerable sediment that has the potential to cause any Project work to fail and exacerbate flooding risk downstream. Selecting a preferred alternative now may remove potential options for Stanford in their own future project work because of limitations from the future channel based on this Project. Worse still, it could force them into a proposed solution that will not adequately meet fish passage, flood risk reduction, or other objectives, as has been raised by permitting agencies in the past (Attachment E: March 30, 2015 Letter from the San Francisco Bay Regional Water Quality Control Board to Stanford University).

SFCJPA has long known, through their own studies, Searsville Working Group participation, and attached documents, that the current hydrologic and sediment transport conditions below Searsville Dam are artificial and that massive change is imminent, regardless of when or if Stanford University takes any action at the dam. For example, as noted in the Searsville Working Group, a single large storm event (especially following a fire) without any University action could completely fill the reservoir in and all downstream projects and infrastructure would be dealing with hydrologic and sediment transport. Alternatively, a proposed Searsville Dam modification or removal would change existing conditions downstream dramatically. There is no active or passive scenario being considered right now that results in the current hydrologic and sediment transport conditions persisting for the lifespan of the proposed Project. It is therefore irresponsible **O3-11** for SFCJPA to propose Project designs based on soon-to-be-altered creek conditions. Such an approach could also significantly limit future projects being actively planned and result in reduced flood protection and/or ecological benefits. For example, if the JPA channel modification or bridge designs are undersized based on current conditions. then imminent conditions with higher sediment transport and/or reduced channel capacity could overwhelm the proposed infrastructure. Design considerations for the proposed Project must consider adequate sediment transport whether the dam was modified, removed, or filled in without action. SFCJPA and its consultants have extensive models and analysis describing the coming changes with Searsville, yet fails to provide them or to utilize them in considering and developing alternatives. This is a fundamental and unacceptable flaw in the DEIS.

O3-11 Con't

The undersigned groups advocate for a requirement through the Biological Opinion terms and conditions process (NMFS) or 1600 Lake and Streambed Alteration conditions process (CDFW) for SFCJPA to formally coordinate with Stanford to ensure that a clear public plan for Searsville Dam and any associated work is released before a preferred alternative for this Project is selected. Success or failure of any proposed Project will be dictated by finding an effective fish passage and sediment management solution at Searsville Dam that ameliorates flood risk for downstream communities and reduces risk of loss of life or property.

While formal Section 7 Consultation under the Endangered Species Act with the National Marine Fisheries Service will be required privately with SFCJPA out of this process, we request that a project of this scale and significance be opened to greater public review to ensure an alternative is selected that is compatible with upstream operational changes at Searsville Dam. In addition to the permitting agencies (NMFS, the California Department of Fish & Wildlife, the San Francisco Regional Water Quality Control Board, and others) our groups would like to re-engage with Stanford and SFCJPA through the Searsville Working Group to ensure that critical Project components are compatible with, and adequately address, the significant technical concerns raised with Searsville Dam operation. These discussions should have public release of necessary documents as required outcomes, which can then inform decision making and public comment to shape revision of the DEIR before release of a complete and sufficient EIR and eventual selection of a preferred Project alternative.

O3-12

Thank you for your careful consideration of these comments. Please contact us if you have any questions about these comments or need any additional information.

Sincerely,

Patrick Samuel, Bay Area Program Manager, California Trout
Matt Stoecker, Director, Beyond Searsville Dam
Eric Wesselman, Executive Director, Friends of the River

Cc:
Len Materman, San Francisquito Creek Joint Powers Authority: len@sfcjpa.org
Kevin Murray, San Francisquito Creek Joint Powers Authority: kmurray@sfcjpa.org
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Redgie Collins, California Trout: rcollins@noaa.gov
Gary Stern, National Marine Fisheries Service: gary.stern@noaa.gov
Sean Cochran, California Department of Fish & Wildlife: sean.cochran@wildlife.ca.gov

Attachment A: November 5, 2012 letter to California Department of Water Resources Division of Safety of Dams

David A. Gutierrez
November 5, 2012
Chief, Division of Safety of Dams California Department of Water Resources
Dave.Gutierrez@water.ca.gov Sent via e-mail

Re: Searsville Dam (No. 614) Safety Information and Request

Dear Mr. Gutierrez,

Thank you for your September 27, 2012 letter and the time spent on our recent phone call. I appreciate your thoughtful consideration of the safety issues we have brought up with Stanford University's Searsville Dam and your direction to Division of Safety of Dams (DSOD) staff to further investigate several issues we covered. As discussed, we submit the following information and requests regarding Searsville Dam safety. As described, we remain deeply concerned, based on information below, that Searsville Dam does not comply with DSOD safety requirements, that current and planned Stanford management activities at Searsville do not appear to adequately address existing and imminent safety concerns as conditions rapidly change at the reservoir, and, as a result, the dam poses a significant hazard to life and property upstream and downstream.

Searsville Dam Safety Compliance Concerns

We believe that data presented here shows that Searsville Dam is either not in compliance with DSOD safety requirements, or additional assessment is needed to make an informed determination. This letter addresses the following issues:

1) Spillway Adequacy and Associated Scour 2) Outlet Valves and Emergency Drainage Adequacy 3) Dam and Reservoir Relationship to Upstream Flooding 4) Cracks in the Dam and Seepage 5) Seismic Stability and Reservoir-Induced Seismicity 6) Surveillance Monitoring

As conditions at Searsville Dam and Reservoir, as well as upstream and downstream, rapidly approach a significant change with the reservoir becoming filled in with sediment, the matter of Searsville Dam safety has become urgent. As shown in this letter, the configuration of the dam, reservoir, and outlet drainage capacity have changed from the original design plans and data with DSOD certification documents. Several DSOD safety calculations and conclusions appear to be based on previous conditions that no longer exist and, in some cases, outdated or undefined data. As noted below, reservoir sedimentation has reduced outlet conveyance and emergency drainage capacity. The spillway no longer has control gates and fails to adequately convey moderate flood events, resulting in overtopping of the entire dam crest and associated scour of "weak" abutment material. Experts have predicted that Searsville Reservoir may fill in completely with sediment within the next major flood event and the reportedly unfinished, stepped face of the dam and abutments would experience elevated sediment mobilization and scour. The presence of the dam, subsequent raising of the dam height, and construction of the Searsville Causeway have been identified by experts as primary factors in the ongoing sedimentation and flooding problem upstream of the reservoir onto private property. Proposed Stanford management actions within the reservoir area, such as channel excavation and re-routing of Corte Madera Creek, are expected to result in the more rapid filling of the main reservoir and elevated sediment transport downstream. Previous reports commissioned by Stanford and others have acknowledged that such uncontrolled, and unmitigated, addition of sediment to the downstream channel has negative impacts to both downstream flooding and listed wildlife.

While Stanford continues to study Searsville Dam, we know of no long-term plan to address these imminent safety concerns. We note that almost a decade ago the Department of Water Resources offered to study alternatives to address Searsville as part of a collaborative Searsville Working Group and Stanford declined this offer. The currently proposed Stanford Habitat Conservation Plan, a project proposal almost 10 years in the planning, specifically excludes covered activities for Searsville despite the fact that complete filling of the reservoir with sediment is expected to occur within the timeframe of the HCP. More recently, the 5-24-2007 DSOD inspection report stated that a detailed foundation inspection of Searsville Dam was warranted: “It has been approximately 40 years since this inspection was performed and approximately 117 years since the construction of this dam. The dam has aged and undergone few earthquakes since then. In light of the above mentioned reasons, it would be prudent to dewater the pool and observe the downstream toe, groins, and foundation conditions with field branch personnel and geology branch.” At our request, DSOD recommended that Stanford coordinate and carry out this inspection and in 2010 Stanford requested more time to carry this inspection out by the end of 2012. This inspection will not be occurring before the end of 2012 and we understand from the Department of Fish and Game that Stanford had not contacted them about permitting this inspection and creek dewatering until this year; almost 5 years after the DSOD inspection report noted that a detailed survey of the dam was warranted.

The safety implications surrounding Searsville Dam’s present condition, ongoing and planned management, and imminent change in sediment transport are profound. As noted by your agency, and cited by the U.S. Army Corp of Engineers and County of San Mateo, Searsville Dam is categorized as a “High Hazard” dam with “probably loss of lives and property damage” in the event of a failure. The 2006 SPEAR3 Final Safety Assessment Document notes the catastrophic outcomes of a Searsville Dam failure: “Another study, entitled "Flood Studies, Limits of Flooding in the Event of a Failure of Searsville Dam owned by Stanford University" (Delta Consulting Engineers 1974), mapped the flood plain that would result from the maximum catastrophic failure of the Searsville Dam and the corresponding release of 60,433 cfs. This release is about 6 times the 500-year peak flow of 10,500 cfs for San Francisquito Creek and Los Trancos Creek combined.” See the “Dam Failure Inundation Area-San Mateo County” map in the Appendix section to see the massive extent of the predicted flooding in Menlo Park, Stanford, Palo Alto, and East Palo Alto. The San Mateo County “Earthquake Shaking” map for the San Andreas Fault shows Searsville Reservoir and Dam within the maximum shaking zones (see Appendix). The San Mateo County “Earthquake Liquefaction” map shows the highest levels of liquefaction occurring at Searsville Reservoir (see Appendix). Finally, the “FEMA Flood Zones in San Mateo County” map shows the dam-related sediment depositional areas upstream of Searsville Dam, and the remaining open water of the reservoir, categorized as “Inundated by 100-Year flooding” (see Appendix). The FEMA flooding area clearly encompasses the original reservoir boundary area, current dam-influenced sediment depositional areas, and flood flows backing up the inlet streams behind the sediment deposits. Due to the safety concerns outlined above and detailed below, we request the following from the Division of Safety of Dam:

Short-term- 1) Requirement that Stanford coordinate with DSOD and complete the already discussed Searsville Dam inspection and associated reports by the end of 2013, with additional detail described in this letter. 2) DSOD utilize Section 6081 of the California Water Code to order Stanford to lower the reservoir elevation to prevent further upstream sediment deposition and related flooding on private lands and roadways.

Long-term- 1) DSOD utilize Section 6081 of the California Water Code to order Stanford to develop and submit a long-term plan for Searsville Dam, with watershed stakeholder input, that reduces or eliminates Searsville-caused sediment deposition and associated upstream flooding on private lands and eliminates other identified safety concerns associated with the dam and operations by the end of 2014. 2) With the above plan, and if Stanford intends to keep the dam in place, we request that DSOD require Stanford to recertify the dam inputting updated and accurate data since previously entered data points, and resulting calculations, have changed.

Thank you for your consideration of the enclosed information, DSOD staff research into this matter, and response. Please contact me with any questions.

Matt Stoecker Director
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(650) 380-2965

Cc:
Richard Roos-Collins, Water and Power Law
Steve Rothert, California Director, American Rivers Inc.
Beyond Searsville Dam Board and Advisory Council

Attachment B: May 5, 2015 email to SFCJPA Executive Director

From: Matt Stoecker <mattstoecker@mac.com>
Date: May 5, 2015 at 12:18:54 PM PDT
To: Len Materman <len@sfcjpa.org>
Subject: Flood Attenuation - Searsville
Hey Len,

I'd like to jump on a call with you to discuss what was said at the last AG meeting regarding flood attenuation for the different alternatives. Specifically, how the orofice option compares to the dam removal option combined with all the flood attenuation features we discussed, and Stanford left out of the Nov 13 meeting table and analysis. Pat F., Steve R. and I all recall (and I have notes confirming this) that the consultants acknowledged that their Dam Removal numbers didn't include the larger off-stream detention pond and reservoir area attenuation and controls at middle and upper reservoir areas and floodplains. Jonathan Owens acknowledged that dam removal with these features would be on par with the orofice option in terms of flood attenuation and without debris blockage and dam failure risks. They told us at that meeting that they would get back to us with updated numbers including those features…. and never did.

Based on Chris Field's comments about the orofice performing better than all others, I'm concerned that the Steering Committee did not receive those updated numbers either. Their announcement is promising, I think, in that it supports many of the needed changes to accommodate dam removal (storage, diversion location, well-managed sediment transport). I'm confident that the resource agencies will not permit leaving the dam in place as a flood control structure due to ongoing debris blockage, fish passage issues, and chronic siltation within and downstream of the reservoir area. NMFS has been pulling permits and requesting removal of these kinds of dams elsewhere.

I think there is a unique opportunity right now to tweak this orofice alternative so that it is part of dam removal (as it has been used elsewhere to flush sediment in a controlled way), to build out all downstream flood protection measures, and then remove the dam when everything is ready. This would get agency support, funding support, and could be implemented faster. As with the Ventura River, Elwha, Rogue and other projects, I think a San Francisquito Creek Ecosystem and Flood Protection plan that incorporates all that is needed would gain strong permitting and funding support, while the orofice and fill in options will languish and fail to achieve what is needed in a basin wide approach.

You and the JPA have a lot of power right now to help direct where this goes. I'd be interested in talking got you about an approach that achieves all of the needed flood protection and ecosystem improvement measures in an attractive package. It might be multi-phase, but the end result and plan is what agencies/funders would really be drawn into.

Would love to talk more if you have some time.
650-380-2965
Matt

Attachment C: April 11, 2013 Searsville Initial Technical Studies Review and Recommendations

Searsville Initial Technical Studies Review and Recommendations
Submitted by Technical Studies Subcommittee members: Matt Stoecker, Beyond Searsville Dam
Steve Rothert, American Rivers 4-11-13

Page 1- Additional Technical Study Needs
1) Summary of Existing Biological Conditions- Add Hydro and Geomorph 2) Summary of Historical Ecology/Hydro/Geomorph Conditions (pre-dam) 3) Summary of Searsville History, Existing Facilities and Operations 4) Steelhead Monitoring Program 5) Summary of Existing Searsville Dam Safety Issues 6) Searsville-related Flood Attenuation Options 7) System Response tasks- For each alternative add Public Safety and Climate Change Discussion 8) Addition of "System response to Hybrid Alternatives" task with at least 2-3 alternatives discussed.

Creek Gage Installation and Monitoring
1) Studies scope descriptions of flow monitoring appear to be focused on "peak-flow" and do not appear to also focus on "base-flow" and critical summer/fall surface flow (amount, extent, duration) data needs, which are critical to developing interim measures, describing existing biological conditions, and assessing fish passage and other Searsville alternative responses. Request- Add detailed base-flow monitoring before later Spring and extend this effort through at least the end of 2014 to capture at least two seasons and variable conditions. 2) Gage's do not capture water/sediment data from others Searsville sources (Skipper's Pond Creek, Westridge Creek, other Corte Madera Creek drainage areas downstream from Westridge Bridge Gage. Alambique Creek Gage location is below Upper Searsville Marsh so is impacted, altering water quality and quantity and sediment transport from Alambique Creek upstream of the reservoir influence. Sausal/Dennis Martin gage does not differentiate between the two creeks and occurs downstream from their confluence and within Searsville Reservoir influence. These gage locations will lead to inconsistent data of tributary flows and sediment transport previously recommended to be "upstream from reservoir/sedimentation influence". Recommendation- Describe the above limitations in the report and conduct summer/fall surveys of Upper Alamabique Creek flows (upstream from the second upstream Portola Road crossing), describe conditions in Sausal and Dennis Martin immediately upstream from their confluence, and describe input from other non-captured streams and reaches described above. 3) So far, this has been an abnormally low rainfall year (despite the early high flow event of Dec. 24). We understand from our call that URS will describe findings in the context of this water year and where possible for analysis, utilize other existing Balance data to define low, moderate and high flow year conditions (ie Corte Madera Creek at Westridge, Searsville Dam outflow, etc.) and summarize existing water data parameters. 4) We request that all gages be equipped to collect water temperature, turbidity, DO, flow (high and base/summer flows to the 100th of a cfs) for comparison and coverage of input/output to and from Searsville Reservoir. 5) Figure 1 notes that flow measurements are to be taken at Corte Madera Creek on the sediment delta to assist with fish passage interpretation. We request that this effort also be carried out for sediment depositional areas on Alambique, Sausal, and Dennis Martin Creeks. We request that this effort and data be incorporated into our recommendation for expanding the fish passage study to

include passage feasibility at these locations and to and from these tributaries. 6) We understand form our call that URS will be sending us a table/list of each watershed gage, location, and what parameters are being measured. 7) For the existing biological and facilities (recommended) conditions studies, interim measures, and system response efforts we request that URS studies compile data and assess Searsville diversion impacts below the Searsville Booster Pump Station and sediment/reservoir water discharge along San Francisquito Creek approximately 2 miles downstream from the dam site. Currently, no gages or studies are identified to describe/assess this component of the Searsville operation and impact on existing biological conditions and other study scope tasks. 8) Water Budget- The described monitoring stations and studies do not provide enough data to develop a complete water budget for Searsville operations and watershed, an essential task to adequately describe existing conditions and to assess alternatives (such as interim flows measures, water diversion options, and system responses to alternatives). We recommend that the study scope be expanded to include development of a complete water budget that incorporates all Searsville water inputs and outputs including, but not limited to, all tributary inflow, dam spill, diversion amount and duration (seasonal and annual), reservoir evaporation (annual/seasonal rates and totals), estimated reservoir sediment vegetation transpiration (annual/seasonal rates and totals) and groundwater/spring input sources (using existing data and difference following above input/output amounts). It is particularly important for the interim measures and alternatives system response results that the critical summer/fall water budget and resulting flows downstream of the current dam location are defined and estimated for each alternative. We understand that much of this additional information has been studied by Stanford and already exists, for relatively easy incorporation into the current study scope.

Interim Measures Assessment

1) We recommend that this scope be expanded to assesses additional parameters impacting downstream flows and biological conditions. Reservoir evaporation, transpiration (reservoir sediment vegetation), groundwater/spring rates and annual totals must be included to accurately assess existing and potential future flows and surface water availability, biological conditions, interim flow measure options and alternative responses. 2) We recommend that fish habitat below Searsville on Corte Madera Creek be quantified (using DFW habitat survey protocol), not simply “observed”. The assessment and development of interim habitat measures must extend past Corte Madera Creek and down San Francisquito Creek to the Bay. 3) We recommended that the interim measures list include measures to address the Searsville Booster Pump Station’s described sediment discharge and reservoir water releases along San Francisquito Creek. We also recommend that the Stanford proposed Lagunita Dam removal and modification/bridging the JRBP instream road crossing on upper SF Creek be added to the interim measures list since Searsville releases, or lack of releases, impact fish passage effectiveness at these partial steelhead barriers. 4) Along with fellow Technical Study Subcommittee members Corinne G. (DFW), and Shani K. (SCVAS) we strongly recommend the addition of a critical riffle and ramping flow study to assess steelhead migration for interim and long-term alternatives consideration. These studies are critical downstream of the dam to adequately develop interim flow measures (i.e. to avoid entrapment) and for long-term alternatives assessment (i.e. for fish passage assessment and system response alternatives). Critical riffle surveys were also recommended by TSS members upstream of the reservoir across reservoir influenced sediment deposits to accurately assess fish passage options and system responses to alternatives.

Summary of Existing Biological Conditions

1) We recommend that the scope include URS collecting relevant Searsville and watershed data from TSS members. 2) The scope's study area is currently limited to "just upstream of areas of sediment depositions or influence by Searsville" to the Bay. This needs to be expanded to match the overall Searsville and Advisory Group agreed geographic study area. The AG agreed the study area includes the entire watershed and Bay wetlands near the creek mouth. The described geographic scope should to be expanded for certain species and sitautions to sufficiently determine System Response to alternatives (i.e. what is predicted with provided steelhead access to upstream habitat, how would listed species like red-legged frog, pond turtle, SF garter snake respond to no migration barrier or reservoir at Searsville and improved access to upstream habitat and connectivity with documented upstream populations, how would existing steelhead populations in Bear and Los Trancos Creek respond to actions that improved flow rates, water quality, renewed transport of habitat features (gravel/wood), and reduced/eliminated non-native species during their migration along the mainstem of SF Creek?) 3) We recommend that the study report differentiate between what open water and wetland habitats (and other habitat types) result from Searsville and what habitat occurred there before the dam and could remain there without Searsville or be restored. This is critical to accurately describe existing conditions and discuss system responses to various alternatives. This requires the addition of an historical ecology study we recommend and understand will be incorporated into Phase 1. 4) We recommend that existing habitat and water quality conditions in the reservoir/open water areas and upstream and downstream creek reaches be added, and differentiated between pre-dam and Searsville influenced conditions, and include: seasonal stream flow rates/duration/distribution, seasonal water quality in creeks and open water habitats (temp, DO, turbidity,) 5) We recommend the removal of the bat impact sentence which is inappropriate in this study scope document and shows a predetermine bias against alternatives other than status quo or no action. It is disappointing to see this language in a study scope document before analysis and without incorporating study findings and other scientific study findings related to bat response following other dam modification/removal and restoration sites. 6) We recommend that the study define and discuss to what extent Searsville has resulted in riparian woodlands within and around the former reservoir site and compare to the pre-dam extent of riparian woodlands in the area and quantity, independent of Searsville. Define/discuss how much of the existing riparian woodland habitat was already riparian woodland habitat pre-dam and potentially would still be with various alternatives. Define the amount of riparian and wetland habitat (and other types) that have been submerged or buried by Searsville Reservoir and sediment deposits. This critical task requires the historical ecology study recommended. 7) We recommend adding a discussion and summary of scientific findings/reports describing non-native species competition and predation impacts by reservoir species present in Searsville on native wildlife and what these findings mean for the existing biological conditions within Searsville/SF Creek watershed.

Dam Modification, Removal, and Hybrid Options (See Hybrid features below in System Response)

1) We recommend considering adding several Hybrid Options incorporating features of other alternatives into various combinations or as individual add-ons (flood protection, habitat restoration/protection, diversion/storage alternatives, fish passage, etc.) We believe hybrids need to be identified and evaluated before any individual element or alternative is rejected, and our

understanding is that Stanford has committed to not eliminate any major alternative as a result of this first phase of work. 2) We recommend the inclusion of construction and operational cost estimates over a 50-year timeframe. We recommend that the study discuss and identify which alternatives are expected to be attractive for outside grant funding and how estimated costs may be impacted (ie some alternatives would likely attract outside funding and grant sources and lower Stanford's costs, while some would likely attract no outside funding and rely exclusively on Stanford funding). 3) We recommend that dam modification and removal alternatives discuss and include likely habitat restoration efforts that would occur in conjunction with the alternatives (ie native planting and weeding, erosion measures, etc). 4) Four broad dam removal alternative concepts are listed in this scope, but only two alternatives are to be developed in the "System Response" section of this report. We recommend that at least four dam removal alternatives are developed per the scope's own description of four general dam removal strategies.

Sediment Removal Options (add Stabilization, Managed Transport, Phased Release)
1) The scope's listed activities do not address key sediment management issues and is unfairly focused on dredging studies that keep the dam in place. We understand from our call that URS agrees with this point and that Stanford will add sediment management options to this scope. 2) We recommend adding the following concepts for additional study: a. Identify likely sediment and vegetation stabilization locations and methods, particularly at upstream sediment depositional areas and desirable riparian woodland areas. b. Utilization of Lloyd's Pond (Upper Marsh) and Middle Reservoir area as open water/seasonal wetland areas, water storage and groundwater recharge basins, flood attenuation basins, and sediment settling basin(s) with the potential for occasional excavation/dredging and minimization of downstream sediment transport and peak flows. c. Determine managed sediment transport feasibility and options. Identify flow needs and potential for optimized and managed transport of some sediment to the Bay, minimizing channel aggradation, and partial sediment stabilization with optimal flow trigger releases.

Searsville Dam Fish Passage Options
1) As noted by several other TSS members the stated scope of work for fish passage analysis is inadequate. The scope does not address passage at the critical Searsville influenced sediment deposits and dense vegetation areas, altered upstream and downstream stream surface flow/duration, no essential critical riffle assessment (upstream and downstream), and inadequately describes using design flow calculations based on "existing conditions", which do not have downstream flow measures in place. Unlike other alternatives there are no cost estimates to allow a meaningful comparison with other alternatives. As TSS members requested, costs and fish passage alternative descriptions need to include construction and ongoing annual operational needs, including estimation of flows and water quality necessary for passage alternatives to function properly. We recommend, along with other TSS members that the fish passage analysis include passage across the reservoir (for both upstream and downstream timing), critical riffle studies upstream and downstream of the dam and reservoir, ramping flow study downstream of the dam, and passage at tributary sediment depositional areas and dense vegetation areas influenced by Searsville Reservoir and operations.

Upstream Model Development

1) We recommend that models to be developed include base flow conditions (rate, extent, duration) and relationship to reservoir influenced sediment deposits. 2) We recommend the assessment include a current estimate of reservoir influenced sediment deposition upstream of open water areas (extent and amount) and comparison with pre-dam channel profiles. 3) We recommend that the study differentiate between the "existing" sediment baseline and pre-dam sediment baseline in order to compare alternatives and determine existing Searsville influenced sediment and channel configuration vs. pre-dam sediment and channel conditions.

4) We recommend that reservoir area flood attenuation models be developed to compare alternatives and resulting flood attenuation estimates. It is important that all alternatives and pre-dam conditions be assessed and compared for predicted/potential flood attenuation impact. The Historical Ecology Study should include, or this section should include, an historic hydraulic study to qualitatively determine pre-dam flood attenuation and conditions. This will enable assessment and comparison of the full range of alternatives. 5) Include review and discussion of SM County Liquefaction and Flooding maps and implications on upstream flooding, sediment, reservoir filling, and reservoir/dam safety (in section to address dam safety).

Downstream Sediment and Flood Assessment Approach

1) Include incorporation of existing SU and SM County flood inundation data results for dam failure assessments (Report sent to Tom Z. following our call). 2) We request that the described workshop include TSS members.

Water Diversion and Storage Options
1) We recommend that the Water Diversion and Storage Options study include development of non-stream diversion and non-reservoir storage options (groundwater, off-stream tanks, dual purpose wetlands) and alternative supply sources (wells, wastewater re-use, stormwater run-off) and reference or incorporate information developed by Stanford in other studies/programs to quantify non-potable water reduction and efficiency measures (less irrigated grass, more drought tolerant landscaping, more water efficiency measures). 2) We recommend that climate change and greenhouse gas emissions impacts be determined for each alternative developed in Phase 2. We recommend that existing study findings on greenhouse gas emissions from reservoirs and reservoir sediment transport impacts on coastal wetlands and sea-level-rise be incorporated in this section and alternative system response section.

System Response Studies 1) As noted earlier, we recommend that this section differentiate between existing conditions and historic conditions and define what conditions are Searsville Reservoir influenced vs. what conditions occurred pre-dam or might occur with no dam or modified dam alternatives. As noted earlier, we recommend that a complete fish passage assessment be conducted and that climate change and dam safety studies be added to adequately assess future biological, flooding, and other conditions with each alternative.

Potential Future Action-
No Action
a) Near future- We strongly recommend that downstream biological impacts be added to this section. The scope inaccurately states that no action "impacts similar to existing". As is detailed in the previous NHC and other reports, downstream conditions are changing rapidly as each high

flow event reduces the size and sediment trapping efficiency of the reservoir with major changes to downstream turbidity, suspended sediment quantity, rate of non-native species transport over the dam, and other more.
b) Far Future We recommend that the “Far-future” horizon be quantified.
Reservoir Storage Recovery Options

1) As noted earlier, we recommend adding the assessment of storage recovery options for Middle Reservoir area (upstream of Causeway) and Upper Marsh individually and together with the Main Reservoir absent. 2) We recommend a table with side-by-side comparison of water volume outcomes from this section to the previous section results (Water Diversion, Storage) and long-term sediment management needs.

Reservoir Water Surface Modification Options
1) We recommend that this section include the above mentioned additional storage recovery options and incorporation of flood protection features from managing the surface elevations of these open water areas to maximize flood protection benefits.

Dam and Sediment Removal Options
1) As noted earlier, we recommend that at least 4 dam removal alternatives be developed as identified on page 8. “The potential range of removal options may include full depth or partial depth notching of the crest, partial lowering of the entire crest, and complete removal of the entire dam structure.” We recommend and understand this above statement to recognize the temporal options within these alternatives, such as phased notching or full crest lowering over multiple years (ie 2,3,5 etc.) and the variable outcomes of these different construction duration options. 2) We recommend that the above alternatives include consideration of varying volumes/areas of sediment/vegetation stabilization and varying managed levels of sediment transport or managed release during determined optimal flow events to maximize sediment transport to the Bay and minimize aggradation downstream. Models exist to assess these optimal flows and sediment transport characteristics (ie DREAM model)

Hybrid Options (Add)
We understood for our call that URS agreed that Hybrid Alternatives are likely to be considered as preferred alternatives due to their incorporation of multiple features with multiple benefits and that modifying the scope to add several of the promising Hybrids would not be difficult. We strongly recommend that several Hybrid Alternatives be developed in Phase 1 and include combinations of dam/reservoir modification and removal alternatives with the following, and potentially other, design features: 1) Stabilization of varying amounts of the upstream reservoir sediment deposits and woodlands 2) Maintain some/all of Lloyd’s Pond (Upper Marsh) with design features to maximize wetland habitat quality, flood attenuation, and/or sediment trapping/disposal. 3) Maintain/restore some/all of the Middle Reservoir area to open water or seasonal wetland with design features to promote wetland habitat, flood attenuation, and/or sediment trapping/disposal. 4) Full dam removal with complete or partial sediment removal and reservoir area design that maximizes natural flood attenuation features, groundwater recharge, seasonal and permanent open water, and native habitat features. 5) Modification or removal of the dam with construction of an aerial bridge and central research platform across the crest location to maintain trail access and enable enhanced/ongoing research function.

Analyzing System Response-
1) Upstream Biological Response- We recommend that this section compare the amount and extent of stream habitat, riparian woodland and other habitat types, open water, for all alternatives and known pre-dam conditions. This section must be able to utilize the recommended Historical Ecology study. The section should assess and discuss shortterm and long-term biological impacts and outcomes. We recommend that the response assessment identify and include likely restoration measures needed (ie native vegetation planting, non-native veg removal, erosion prevention) and long-term outcome predictions utilizing other dam filling/modification/removal project result findings. It is essential that certain alternatives with limited differences between short-term and longterm outcomes (ie status quo) be compared over the short-term and long term with other alternatives that have very different outcomes immediately following implementation and decades later (ie dam removal). 2) Downstream Biological Response- As above, we recommend that this section assess short-term and long-term biological impacts and outcomes.

Add Steelhead Monitoring Program and Lagunita Dam Removal Study
Stanford's Dec. 6, 2012 letter to NMFS states: "In addition, during the suspension period Stanford remains committed to continued steelhead conservation in San Francisquito Creek, such as steelhead monitoring activities and other interim measures and studies that are being developed through the Searsville Alternatives Study process. Likewise, Stanford will continue to evaluate possible creek enhancement actions, such as removing the non-operating Lagunita diversion dam along with its fish ladders. These actions will help inform future decisions in the San Francisquito/Los Trancos Basin."

We recommend that the steelhead monitoring study be developed with the TSS and wildlife resource agencies and include: - Adult steelhead migration (occurrence, upstream and downstream migration timing and flows, at lower SF Creek and CM Creek locations) - Fish passage effectiveness and flow requirements/limitations at Lagunita Dam and JRBP crossing, related to interim flows and ramping at dam (early winter and late spring).

We recommend development of a timeline and studies for the described Lagunita Dam removal.

Add Historical Ecology Study (Phase 1 except last bullet Phase 2)
- Detailed (pre-dam assessment and data compilation) outlining extent, amount, and type of different habitat types and species documentation. - Effort should include a detailed historical mapping effort and products describing the Searsville area habitats pre-dam. - Utilize a methods to allow comparison of historic vs. existing quantity and distribution of habitat types (grasslands, riparian woodlands, stream distance, wetland extent, open water, etc.). -Enable future use of this model to overlay alternatives (Phase 2) to determine system responses and changes in amount and extent of habitat types immediately following implementation and long-term.

Add Impact on Climate Change to System Response Section (Phase 2)-
- Assessment of climate change implications for alternatives (50-yrs+) - GG emissions, carbon equivalent, carbon capture, oxidization - Sediment transport, Bay wetlands, and Sea-Level Rise - Changes to stream water temps, flows, wildlife migration and adaptation

Add Dam Safety to System Response Section-
Completion of DSOD recommended (2007) footing/geology inspection with DSOD and Geologist (Phase 1) - Present existing Emergency Action Plan (Phase 1) or summarize key components needed for alternatives in Phase 2 - Determine structural condition and identify safety issues (seismic and non-seismic) at present and into the near future - Conduct a current study to determine the integrity of the dam's adjacent geology (Phase 1) - Conduct a study to determine spillway/outlet capacity adequacy, blockage hazards, present and future dam face wear and compliance with DSOD regulations. (Phase 2)

Economic Analysis of Alternatives added to each alternative (Phase 2)
Construction, operational/maintenance, sediment management (50-yrs+) - Grant/funding potential for each alternative

Add a discussion of potential liabilities with each alternative (Phase 2)
- Associated with each alternative (50 yr+ timeframe)

Additional General Recommendations
3) TSS review and comment on draft URS report(s) 4) Summary and easily understandable table that compares responses to historic/existing/alternatives (ie extent of open water, extent of riparian forest, extent of stream mileage, construction and ongoing costs, flood attenuation, sediment stabilization/removal/transport, ongoing maintenance needs, safety, etc.) 5) Assess and discuss outcomes of JPA, CalTrans, and other flood protection measures being implemented and proposed within study areas and system response implications for alternatives. 6) As with the first paragraph, please use the term "Reservoir" throughout this document and future reports instead of "Lake", which is inconsistently and incorrectly used on occasion.

Attachment D: September 21, 2015 email to Permitting Agencies re: Searsville Dam Alternatives, Data Gaps, and Information Requests

From: Beyond Searsville Dam Subject: Searsville Alternatives Data Gaps and Requests Date: September 21, 2015 3:18:54 PM PDT To: Brian Cluer <Brian.Cluer@noaa.gov> Amanda Morrison <Amanda.Morrison@noaa.gov> Gary Stern <gary.stern@noaa.gov> Corinne Gray <Corinne.Gray@wildlife.ca.gov> Scott Wilson <Scott.Wilson@wildlife.ca.gov>, AL.Riley <AL.Riley@waterboards.ca.gov> Setenay Frucht <Setenay.Frucht@waterboards.ca.gov>, Marcin Whitman <MWhitman@dfg.ca.gov>

Hello all,
We understand that Stanford will be meeting with resource agencies this week to discuss alternatives for Searsville Dam. We are glad to see this issue moving towards a more thorough and transparent public review process that incorporates your expertise. For many of us involved in Stanford's Searsville Advisory Group, the lack of study transparency and limited alternatives analysis was frustrating. Similarly, Stanford's selection of two preferred alternatives that were not supported by the majority of AG members and which seemingly failed to commit to adequately studying the largely supported dam removal alternative was disappointing. Fortunately, folks on the AG that were experienced with dam removal and modification projects supported dam removal as the preferred alternative (including the Water Board's excellent letter). Additionally, the coming permitting process requires that this "reasonable alternative" be adequately assessed and considered by your agencies and for public consideration. We look forward to working with you to ensure that Stanford provides previously withheld data and carries out additional studies needed. We offer our help in ensuring a thorough level of assessment and comparison between their preferred alternatives and the dam removal alternative supported by multiple agency staff and watershed stakeholders.
Below are a few of the key issues, data gaps, and needed assessments we have identified and which we request you ensure Stanford provide publicly. Many of these were requested of Stanford during the AG process but were not carried out or disclosed to us: Dam Removal Flood Attenuation Data and Analysis AG members noted, and Stanford consultants acknowledged, that a level of enhanced flood protection provided with Dam Removal Alternative 8b could be equal to and even exceed the highest flood protection benefit determined for all other alternatives. This enhanced 8b could include enhanced flood storage capability at Middle Reservoir and Upper Marsh areas, within the reservoir's restoration and floodplain area, and at one or more off-stream basin storage areas (at Beothing and potentially other locations). It is critical that the flood attenuation performance of one or more "enhanced" dam removal options be determined and compared to Stanford's preferred alternatives as it can provide superior downstream (and current upstream) flood protection and public safety. Such an enhanced dam removal option would also eliminate future dam failure risks associated with the two preferred alternatives. Dam Deconstruction and Sediment Management Options Not Evaluated AG members expressed deep concern and frustration that the consultants only evaluated a single phased dam removal approach with removal and trucking/disposal of all accumulated sediment for dam removal options. This ignores multiple, earlier AG requests, to assess multi-phase dam removal / incremental notching as well as determining the maximum amount of accumulated sediment stabilization on site and safe transport of fine sediment downstream during flushing flows to sediment deprived Bay wetlands. It is critical that realistic

and accurate sediment management options be carried out for dam removal and other alternatives.

Climate Change Evaluation of important climate change issues have not been assessed to date; total remaining reservoir area greenhouse gas emissions (CH4, CO2, others), carbon capture equivalent of reservoir area vegetation restoration, exacerbated reservoir and downstream water quality projections with climate change, exacerbated reservoir area evaporation rates and downstream flow impacts with climate change projections, SF Bay wetland sediment needs and sea-level-rise projections, dam/reservoir exacerbating wildlife migration corridor limitations for sensitive species, reservoir exacerbated non-native species expansion, and species adaptation limitations caused by physical, thermal, and biological impediments associated with a dam, fish ladder, fishway, or baffled orifice versus a restored channel and dam removal alternative. Downstream Water Availability and Quality AG members were extremely frustrated that no data or assessment was provided out on how alternatives would impact stream flow quantity and quality within and downstream of the reservoir and dam site.

We request that this information be developed for dam removal and other alternative studies moving forward. It is critical to know how water quality and quantity differs between these alternatives over time and with maintenance requirements or naturally restored conditions. For example, operating the dam as a flood control basin will impose both short and long-term siltation events downstream as water and sediment are captured, stored, and mobilized from the reservoir. Dam removal would not be expected to experience such chronic and long-term siltation and turbidity issues.

“Baseline” Conditions and Alternatives “Effects” Stanford has incorrectly considered the current dam/reservoir as being the “baseline” environmental conditions and with “0” “effect”, while restoring the area to its more natural “baseline” conditions has the largest “effect”. We request that resource agencies properly consider the current, actively managed and altered conditions as being “effected” by the dam, reservoir, and annual maintenance activities (such as annual sediment flushing, diversion modifications, reservoir clearing, etc.).

Biological Data and Alternatives Comparison Analysis Needs Alternative that would include an orifice in the dam · Requires highly engineered fish passage facilities within the bottom of 50-foot long orifice and highly engineered upstream and downstream creek channel structures. Fish passage features required within the orifice and at the inlet would catch significant debris, trap sediment in the reservoir area precluding restoration and require ongoing removal, elevate flood and dam failure risk, and block fish migration during debris blockage/clearing (which occurs during migration flows). · Results in massive, chronic fine sediment discharge downstream during and following high flows and sediment trapping and removal. (See below mentioned NOAA Jeopardy Decision for Santa Barbara County flood control dams with similar orifice feature) · Requires extensively engineered channel creation and energy dissipation features in the downstream channel to prevent scour from the high discharge velocity from the orifice. These features compromise listed Critical Habitat and fish passage. · Most disruptive, ongoing, and restoration averse alternative for the watershed and JRBP. What are the 50 year implications? · Despite constant requests during the AG process, consultants never presented an example of a similar, recently permitted orifice-type flood retention facility that discharges

periodically accumulated sediment into listed Critical Habitat for steelhead, and effectively passes fish. · Recent NMFS Jeopardy Decision against Santa Barbara County orifice type dams details the numerous problematic legal/ESA issues associated with such a facility.
· Unknown safety issues associated with the modified dam's structural stability, dam loading associated with rapid flood control filling and emptying, debris blockage and overtopping/scour issues, reservoir induced seismicity, and adjacent San Andreas Fault activity. · Many problematic fish passage issues associated with the orifice option have not been evaluated: 1) passage conditions within the orifice (length, slope, darkness, attraction flows, downstream scour and jump height), 2) migration flow window, 3) downstream grade control structures and hydraulic stability, 4) inlet debris blockage and removal during migration flows, 5) flood basin storage, discharge plan, and trapping/stranding of outmigrating steelhead, 6) reservoir and downstream water quality and turbidity impacts from operations, 7) upstream migration issues during reservoir drawdown operations and upstream attraction flow issues, 8) postflood reservoir sediment/debris removal, disposal, and duration of turbidity downstream and within reservoir area and impact on fish migration delays, water quality, and spawning/egg incubation downstream.

Alternative that would use a fish bypass channel · Bypass channels have gradient limitations and a footprint that would require massive earth moving of upland habitat and disruption to natural areas and potentially cultural sites. · Roughened channels require much more water to function than fish ladders and experts have acknowledged that this problem, and water limitations at Searsville, likely render this option infeasible. · Roughened channels, especially the "nature-like" type would require constant monitoring and maintenance by Stanford and agencies to ensure adequate fish passage criteria and flows were maintained. · As with ladders, there are significant fish attraction issues at both outlet and inlet locations. Alternative that would retain all/part of Searsville Reservoir complex (open water) · Lethal water quality conditions in the reservoir based on temperature, dissolved oxygen. · Predation of steelhead (and other species) that must migrate through
the open water reservoir harboring non-native predatory species. · Ongoing dispersal of non-natives downstream and upstream · Ongoing, documented elevation of downstream turbidity duration and water quality problems caused by the reservoir. · Ongoing depletion of beneficial downstream sediments and woody debris · Ongoing evaporation of reservoir water and reduction in downstream flow and diversion availability · Not supported by regulatory agencies, who have not even seen the data on other problematic issues besides upstream fish passage (ie reservoir migration/predation /entrapment, delta subsurface flows, thick delta vegetation, etc.) · Permitting feasibility and turbidity issues (plus methane release) associated with ongoing dredging and channel clearing operations. · Additional lands flooded and/or reservoir elevation change problems for steelhead migration and methane emissions. · Ongoing dam safety liability and retrofitting / replacement costs moving forward.

Alternative that would use a fish ladder
· AG members overwhelmingly opposed a fish ladder for this project. · Do not function properly in a highly flashy system such as San Francisquito. High flow blockage and hydraulics, inadequate low flow quantities to operate. · Exhaust the fish right before they face predators in any remaining reservoir area, reducing open water success rates. · Do not pass all types or life stages of fish and ignore other aquatic wildlife migration needs. · Require significant

maintenance and debris removal. Stanford has had ongoing problems and received complaints about the lack of suitable fish ladder maintenance at their Lagunita and Felt fish ladders. They have a poor track record of fish ladder maintenance. · There are significant fish attraction flow issues at both outlet and inlet. · Experts acknowledged the problem with a fluctuating reservoir elevation. We noted that the reservoir elevation is recorded to change as much as 12 feet or more in DSOD survey documents, far more than URS said was feasible with a fish ladder. · If the dam is lowered or reservoir is allowed to fill in with sediment, there are other fish ladder inlet problems associated with braided channels across the reservoir area, accumulated sediment elevation changes, and subsurface flows within the accumulated reservoir sediment.

Dam removal benefits not yet fully assessed or compared to other alterntaives · Provides the most effective, and proven passage conditions for all life phases of steelhead over the broadest range of flows. · Only alternative that provides unimpeded migration connectivity for all other native fish and wildlife species. · Only alternatives that can eliminate ongoing steelhead (and other species) litigation, regulatory oversight, and ongoing “take” mitigation measures. · Does not require complex, and likely unfeasible, fish passage facility flows to facilitate upstream and downstream passage and habitat conditions. · Eliminates water evaporation from the main reservoir, enabling more creek flows within and downstream of the reservoir area. · Eliminates documented and elevated turbidity duration downstream due to the reservoir. Prevents ongoing flood control alternative (orifice) turbidity. · Only alternative that can achieve a long-term, self-sustaining, and effective fish population and other wildlife passage, flow, and water quality solutions. · Enables resumption of unimpeded beneficial sediments and woody debris to degraded downstream habitats and Bay wetlands (with problematic coarse material removed and/or stabilized and flood protection measures already in place). · Most effective way to eliminate non-native species and harmful vector control spraying practices at the reservoir. · Only alternatives that result in miles of newly restored stream, floodplain, and wetland forest habitat within the reservoir area. · Supported by Regional Water Quality Control Board and preferred fish passage alternative for NMFS and CDFW per agency fish passage guidelines.

Thank you for considering these additional data and assessment needs as you consult with Stanford. Please let me know if there is anything we can provide or do to help you move an effective Searsville Dam solution forward.

- Matt Stoecker

Attachment E: March 30, 2015 Letter from the San Francisco Bay Regional Water Quality Control Board to Stanford University

March 30, 2015

Ms. Jean McCown Steering Committee Co-Chair
Searsville Dam Alternatives
Government and Community Relations, Stanford University
450 Serra Mall, Building 170, First Floor
Stanford, CA 94305-2040

Dear Ms. McCown:

The San Francisco Bay Water Board greatly appreciates the initiative by Stanford University to sponsor the Searsville Dam Advisory Group to consider alternative management strategies for the Searsville reservoir. The Water Board intends to remain engaged in this issue by participating in a coordinated review of project alternatives with other responsible federal and State resource agencies as project planning enters into the regulatory process, including preparation of federal and State permits and development of an environmental impact report under the California Environmental Quality Act (CEQA).

The Water Board has broad regulatory authority, as described in the San Francisco Bay Basin Water Quality Control Plan (Basin Plan), relating to the protection and restoration of water quality and the beneficial uses of San Francisquito Creek, including cold freshwater habitat, spawning, fish migration, and rare and endangered species habitat. As stated in the Basin Plan, "Protecting beneficial uses within the Region consistent with the federal Clean Water Act and the Porter-Cologne Act requires careful consideration of projects that result in hydrogeomorphic changes and related adverse impacts to the water quality and beneficial uses of waters of the State." In our role as a responsible agency under CEQA and our role as the State's water quality permitting agency, we will want to be able to review an assessment of the management alternatives, and their influence on natural physical processes and related water quality and habitat conditions, to determine the environmentally-superior alternative.

In addition, San Francisquito Creek and its tributaries are federally-listed as impaired by sedimentation. The mainstem of San Francisquito Creek downstream of Searsville Dam is a deeply incised channel, its habitat is greatly simplified, and the channel is largely decoupled from its floodplain and tidal marsh. The dam contributes to these impairments by creating an imbalance in coarse and fine sediment supply to the downstream reach and also by causing the processes of sediment transport and deposition to be substantially altered. Up until recent decades, Searsville Lake was a complete trap for all of the coarse sediment (gravel and sand) and much of the fine sediment delivered from upstream areas. The dam also remains a complete barrier to steelhead migration, greatly reducing the amount of habitat that is accessible, and placing this steelhead population at much greater risk of extinction.

To address the impairment, the federal Clean Water Act mandates that a "Total Maximum Daily Load" be developed by the Water Board to ensure that San Francisquito Creek is restored and the sediment impairment is removed. We expect that the TMDL and its associated implementation plan for San Francisquito Creek will need to take a holistic approach to implementation, one that emphasizes achieving balanced coarse and fine sediment supplies throughout the watershed, and includes actions to enhance habitat complexity and connectivity in upstream and downstream channel reaches. Consistent with these goals, we support alternatives for the management of Searsville Dam that would restore natural sediment supply and transport to downstream channel reaches, floodplains, and tidal marshes, while also restoring anadromous fish migration to and from the upper watershed. Staff representing the Water Board on the Searsville Dam Advisory Group has emphasized the benefits of sediment continuity between upstream and downstream reaches, natural transport and deposition processes, and the importance of restoring anadromous fish migration. Marsh and floodplains downstream of Highway 101, including the Faber Marsh, ultimately will benefit in the long-term from restored fine and coarse sediment supply and transport, particularly given the need for our Bay marshes to be nourished by sediment in order to be resilient to sea-level rise.

We would like to provide some initial input to the Searsville Dam Advisory Group and Stanford University about our perspective on these matters as alternatives are being considered. We have been, and continue to be, supportive of alternatives that focus on dam removal. We are supportive of giving consideration to sluicing sediment from the dam in lieu of, or in connection with, sediment excavation from the reservoir. On the other hand, we think there will be performance issues associated with the application of fish ladders and operations of orifices in dams to mitigate for fish passage barriers and are concerned about the technical feasibility of constructing bypass channels around the dam.

We look forward to working with you in the future on this important project and would welcome you to come to the Water Board to provide a detailed briefing on the management alternatives under consideration. Please contact my staff, Ann L. Riley at AL.Riley@waterboards.ca.gov, if you have any questions.

Sincerely,

Bruce H. Wolfe
Executive Officer

cc: Gary Stern, NOAA Fisheries: Gary.Stern@NOAA.gov Scott Wilson, Bay Delta Region, California Department of Fish and Wildlife: Scott.Wilson@wildlife.ca.gov Kelsy Rugani, Facilitation Team, Searsville Dam Advisory Group: Krugani@kearnwest.com

-------- Original Message --------
Subject: Stanford comment letter to JPA on DEIR
From: Tom W Zigterman <twz@stanford.edu>
Date: Wed, June 19, 2019 4:28 pm
To: "comments@sfcjpa.org" <comments@sfcjpa.org>
Cc: "Len Materman (len@sfcjpa.org)" <len@sfcjpa.org>

Hi Len:
Attached is our comment letter.
-Tom

Tom W. Zigterman, P.E., D.WRE
Director - Water Resources & Civil Infrastructure
STANFORD UNIVERSITY
327 Bonair Siding
Stanford, CA 94305-7272
650-725-3400
twz@stanford.edu

Stanford University
SUSTAINABILITY AND ENERGY MANAGEMENT

Mr. Len Materman, Executive Director
San Francisquito Creek – Joint Power Authority
615 B Menlo Avenue
Menlo Park, CA 94025
Emailed to comments@sfcjpa.org

June 19, 2019

Subject: Stanford University Comment on the San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101 Project Draft Environmental Impact Report

Dear Len:

O4-1 We appreciate our collaboration with you and the JPA on our respective projects on San Francisquito Creek. We are very much in favor of the capacity improvement projects that have been completed at Highway 101 and east to the Bay, and that are contemplated in the middle reach upstream of Highway 101 as described in the DEIR.

O4-2 Our review comment on the DEIR has to do with the degree to which the DEIR analyzes impacts associated with the detention basins that the DEIR assumes could be located on Stanford land as a possible alternative to increase flood protection. The DEIR should clearly convey that any future proposal to acquire land for, construct or operate the detention basins would necessitate substantially more CEQA review, and that the environmental review of the assumed upland detention projects is programmatic only and further environmental review in the form of a project-level EIR would be needed before any decision to approve acquisition of land for, construction or operation of such basins; that the inclusion of them in this DEIR is for overview programmatic information only, as a context for evaluating the environmental impacts and benefits of the middle reach projects. Subsequent environmental review of the detention basins, if any, would need to be based upon substantially more engineering and design work to identify the actual basin configurations, locations, sizes, and depths, and the specifics of any ancillary facilities such as flow intercept and conveyance structures. There also would need to be thorough analyses delineating and substantiating the magnitude of peak flow attenuation that could be achieved, and extensive environmental review of the potential adverse environmental effects of off-hauling millions of cubic yards of excavated soil, and constructing facilities on sensitive cultural and biological resources.

We look forward to continued collaboration with the JPA and these important watershed projects.

Sincerely,

Tom W. Zigterman

Tom W. Zigterman, P.E., D.WRE
Director, Water Resources and Civil Infrastructure

WATER RESOURCES & CIVIL INFRASTRUCTURE GROUP
327 Bonair Siding, Stanford, CA 94305-7272 T 650-725-8081 F 650-723-3191

-------- Original Message --------
Subject: Upstream of Hwy 101
From: Yitzchok Feldman <rabbif@gmail.com>
Date: Wed, June 19, 2019 5:01 pm
To: comments@sfcjpa.org
Cc: "Jeremias, Michel" <Michel.Jeremias@cityofpaloalto.org>

To Whom It May Concern,

I am the VP of the Palo Alto Community Eruv, a project that went online in 2007. We built and now maintain the Eruv in Palo Alto. If you want more information about what the Eruv does and why it is needed, I refer you to the attached page. The Eruv was built during the summer of 2007, and it is maintained until today, with the cooperation of six jurisdictions: City of Palo Alto, County of Santa Clara, Santa Clara County Water District, Stanford University, Caltrains (the Peninsula Corridor Joint Powers Board) and Caltrans.

ERUV ROUTE

The Eruv depends on a network of walls that surround the city. To the west and the east, these walls include the sound walls along the 101 between San Antonio Rd. and San Francisquito Creek and the extensive fencing along Foothill Expwy from the Stanford Golf Course and then fronting the companies (Nest, VMWare) on Stanford land south of the Dish.

To the north and south, the "walls" we use are the creek banks of Adobe and San Francisquito Creek. We also use fences around Cubberley Community Center and behind Green House on San Antonio Rd.

Where there are interruptions in these already-existing walls, we construct a "doorway" that connects the two sides, with (usually) 20-foot poles on either side of the breach and then fishing line (200 lb test) attached to the top of each pole. Such structures can be found next to SF Creek and Adobe Creek at El Camino Real, Middlefield Rd., and various other places in Palo Alto. O5-1

IMPACT on the ERUV

Some of the proposals for Reach 2 in the proposal (between the 101 and the Chaucer/Pope Bridge) would mean destruction of the present creek bank on the Palo Alto side of the SF Creek. This could disrupt use of the Eruv. We feel fairly certain that the present fences backing onto the creek banks would mitigate this disruption and allow the Eruv to function. But one stretch, from Chaucer to Marlowe, does not have any housing, and therefore there is at present no useable fencing for us to rely on during construction.

We have two requests:

1) We ask that during construction affecting the Chaucer-Marlowe stretch of the creek bank, we be allowed to put up fencing that will facilitate the Eruv during that time.

2) Also, during construction, we ask that our poles along the Palo Alto side of SF Creek -- at Sand Hill Rd., El Camino Real, Middlefield Rd., Chaucer, University Ave., and Newell Rd. -- be allowed to O5-2

remain in place. Moving those poles would incur high expenses for us and could also disrupt Eruv function. O5-2 Con't

Thank you for taking this into consideration,

Rabbi Yitzchok Feldman
VP, Palo Alto Community Eruv
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Rabbi Yitzchok Feldman
Cong. Emek Beracha
4102 El Camino Real
(Mail: 3790 El Camino Real -- Box 2015)
Palo Alto, CA 94306
(650) 857-1800/(650) 857-0601 Fax

rabbi@emekberacha.org / www.emekberacha.org

WHAT IS AN ERUV?

Background:

One of the 39 categories of creative labor forbidden by the Torah on the Sabbath is carrying, i.e. transferring any object from the private to the public domain (or vice versa) or moving it forward in the public domain. The Torah's prohibition, according to many authorities in Jewish law, would apply only to a public domain approximately the size (and busy-ness) of 101 or perhaps 280. But the Rabbis of the Talmud extended the prohibition to all areas not enclosed on all four sides and not intended for dwelling.

This restriction puts something of a burden on families with small children and shut-ins. Spouses must take turns with one venturing out while the other stays home with the pre-walking child. Bringing a meal to someone who is home-bound becomes more complicated. These burdens would be minimal if families lived close to each other. But families are spread out all over town and therefore hindered from meeting together at parks or at each other's houses unless they can use a stroller. Moreover, in smaller communities the synagogue plays a much more central role in community life and getting there as a family on a weekly basis becomes very important.

In extending the prohibition, however, the Rabbis created an alternative. That alternative is called an "Eruv" (literally "mixture" or "combination" in Hebrew). By delineating boundaries around a public space, and then unifying that space under one owner, that space becomes one large private domain. Carrying would thus be permitted. Remember: This did not uproot the original Torah prohibition--it only helps in areas where carrying was forbidden by the Rabbis. This was considered by the Rabbis to be sufficient for protecting the original Torah prohibition.

HOW IS IT BUILT?

An entire Talmudic tractate is devoted to the many specifications of an Eruv and sometimes municipal Eruvin are quite complex to build. These specifications are somewhat simplified in the case of Palo Alto because, much to the surprise of many, Palo Alto is already almost an entirely walled city, at least in the eyes of Jewish law. There are walls and fencing along 101 and a lot of fencing along Foothill Expy. The creek banks along Adobe Creek and San Francisquito Creek also constitute walls (a bank, if it is steep enough, counts as a wall). No less than 75%, and maybe even more, of the city is thus surrounded even before one speaks of doing any work.

In Palo Alto, all that was left to complete the boundary were gaps created when streets like El Camino or Middlefield go over the creeks, or other streets like Embarcadero or Page Mill cut through to 101 or Foothill.

These gaps are "bridged" by creating what is called "*Tzurat HaPetach*," literally, the "form of a door." This door frame, open and fully passable, need be only one side post on each side and a lintel made of woven twine running over them. That is sufficient to continue the boundary.

Letter O6

-------- Original Message --------
Subject: Comments to San Francisquito Creek Joint Powers Authority Draft EIR
From: Nnn Lll <nanides@sbcglobal.net>
Date: Tue, June 18, 2019 9:28 am
To: "comments@sfcjpa.org" <comments@sfcjpa.org>
Cc: Kay Harrison <k.harrison@comcast.net>, Susan Lamkin <susanlamkin@yahoo.com>

Allied Arts Guild is located in 75 Arbor Road, Menlo Park and its property is adjacent to the San Francisquito Creek. The Draft EIR shows AAG in Reach 3 and while we understand that the report doesn't address the erosion issues, we want to take this opportunity to bring out our concerns of bank erosion on San Francisquito Creek.
In June 2014, AAG contracted with an engineering firm to conduct an evaluation erosion study with possible fixes. My understanding is that AAG has had conversations about the erosion with the power joint authorities, but there has not been much progress. Notes from an AAG member state that " parts of the embankment along Creek Drive from Arbor to El Camino are seriously undercut and could affect the roadway". Five years later no work has started at the AAG property and the situation has worsened with slippage of soil down into the creek. O6-1

At the June 5th 2019 community meeting, SFcjpa/Len Materman confirmed that the AAG property is a good candidate for bank fix. AAG wants to follow up on this issue to plan in conjunction with the joint powers authorities the complex project of bank stabilization and restoration. O6-2

Thank you for your attention to this matter.

Nancy Lianides
Allied Arts Guild
75 Arbor Road
Menlo Park 94025

Allied Arts Guild - Welcome

Allied Arts Guild - Welcome

Website Design by LunaGraphica Inc

Allied Arts Guild is home to unique shops and artist studios, located among beautiful gardens and historic Europ...

-------- Original Message --------
Subject: Regarding upstream at 75 Arbor Road Menlo Park
From: Louise DeDera <loudedera@gmail.com>
Date: Tue, June 18, 2019 4:29 pm
To: Comments@sfcjpa.org

We, at Allied Arts Guild, have experience large bank losses over the years. In 1982, the Army Corp of Engineers stabilized our bank in two places after 10' slumped into the creek by the 1885 Barn Wood Shop. In 2006-2007 a slump of 7' of bank occurred and then another slump of 6' required the removal of part of a building. We tried to get permission to stabilize the bank and filled out many forms, but were only allowed at the time to work on the top of the bank. We spent about $265,000 on a shear pin wall and were assured we would be able to do something such as willow weaving or boulders at the bottom of the bank to deflect further eroding of the bank. We have filled out more forms with Fish and Game and others, but still have not been allowed to stabilize the bank. Soon, the only thing standing will be the shear pin wall when it's exposed after the bank erodes.
In the spring each year after the rains, a large amount of water is discharged from under Children's Health Council directly across the creek from our 7' and 7' slumps. That is where we had the shear pin wall installed.
In the interest of safety, protecting our 9 million dollar 2002-2004 renovation, and preserving our 3.5 acres which are open to the public daily except Sunday and benefit Lucile Packard Foundation for Children's Health, please allow us to stabilize our creek banks. Any help by Army Corps of Engineers who did it at Corps' expense would be helpful. O7-1

Best regards,
Louise DeDera
Former President/Guild Director and Current Shop Director
Allied Arts Guild Auxiliary for Children
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Verbal comments received at public hearings

Public Hearing 1

SAN FRANCISQUITO CREEK JOINT POWERS AUTHORITY
DRAFT ENVIRONMENTAL IMPACT REPORT
PUBLIC HEARING

Reporter's Transcript of Proceedings

Thursday, May 23, 2019
Laurel School - Upper Campus Atrium
275 Elliott Drive
Menlo Park, CA

Reported by:
Connie J. Parchman, CSR 6137
Job No. 1-31290

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May 23, 2019, Thursday 7:10 P.M.

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MR. MATERMAN: Hello, everybody. I think we're going to get started.

Welcome, everybody. My name is Len Materman. I'm the Executive Director of the San Francisquito Creek Joint Powers Authority. Welcome to our first public hearing on our Draft Environmental Impact report for Project Upstream of Highway 101. "Upstream" generally meaning west.

And what I think I want to do is to introduce a few key people that will probably help me answer questions, if there are questions. And also say that we have -- we're fortunate to have a court reporter here. This is a hearing. We will document any verbal public comments for inclusion and response in the Final EIR when that comes out later this year.

So, let's see. Let me introduce Kevin Murray. He's going to be running the slides. He's also our senior project manager.

And behind him and to his left is Tess Byler, who's a project manager.

And Miyko Harris-Parker also works at JPA. She does finance administration.

Aaron Carter is right there. And he is the project manager for our EIR consultant. And he can answer questions on the EIR process issues, as can Mike Coleman from the Santa Clara Valley Water District who specializes in environmental review.

And right to Mike's right is Alec Nicholas who works for the Santa Clara Valley Water District and he also is on the team that's designing this project.

I also want to introduce Drew Combs. Drew Combs is elected to the City Council of Menlo Park. And, Drew, thanks for joining us. He's also on the JPA Board.

The City of Menlo Park, like the City of Palo Alto, East Palo Alto and San Mateo County and the Santa Clara Valley Water District, all of them provide elected officials to sit on the JPA Board.

Okay. So here we go. Kevin, do you want to advance to the next slide?

So, the basic agenda today is I'm going to talk for a bit about what the project is and the EIR process and where we are. And then we'll solicit your comments and questions.

In terms of questions, this meeting is not so much about a back-and-forth of answering questions, it's more to hear from you about about the document. But certainly we'll try to answer questions as best we can with the understanding that questions are not going to be included in the environmental document. It's really comments on the project.

There are EIR comment cards also. They look like this. There are a lot of them available. If you feel like either in addition to verbal comment or instead of a verbal comment you want to make a written comment, feel free to fill out this card and either give it to us or mail it to us. And as it is indicated on the bottom of the card, you can also e-mail us some thoughts. But please get it to us by June 19th, which is the end of the public comment period.

So here we are in the process. Back in December of 2016, we produced something called a Notice of Preparation, which is basically an announcement that an EIR is coming.

In January and February of 2017 we had meetings called scoping meetings, which the public provides input into the scope of the EIR.

And in October of that year, we had a series of stakeholder -- what we called stakeholder workshops as well as a public site tour to gather additional information about alternatives.

The EIR was released on April 22nd of this year. And here we are in May and June with draft public meetings. We're actually going beyond, in all ways going beyond, what is required by the California Environmental Quality Act for outreach.

Tuesday of this week we made presentations to the Menlo Park and East Palo Alto City Council. There were announcements at the Palo Alto City Council as well as the JPA Board meetings which are monthly for the past few months.

So the Final EIR -- we will take comments for the Final EIR and they will be incorporated into the Final EIR and the Final EIR will be released later this summer, late summer.

In the fall we will have a hearing on the Final EIR and ask the JPA Board to approve it.

In the fall and spring of 2020, we will seek permits as well as work on any land easements that are needed and complete project financing among our agencies. And we anticipate two years of phased construction, the best case, beginning in the summer of 2020. Given the complexity of the project and the complexity of these three items, it might be -- it certainly might be the case that we start construction in 2021.

Okay. So we have three public hearings. Tonight's. Thank you for coming to the first one. We also have one next Wednesday and the Wednesday after that. Next Wednesday is in East Palo Alto. The one after that is in Palo Alto. If you want to come to all three you are welcome to. Also you can mention to other people if they can't make this meeting there are other opportunities to attend.

Lots of outreach for this meeting. Some of you may have received postcards. We sent out 13,000 of them to the three cities. And all of these other avenues, Nextdoor, and electronic e-mails, websites and print ads in four local papers. And again, presentations at the City Council.

Okay. So a little bit about the project. Some of you probably have seen this many times. But for those of who you haven't, this image, Highway 101 cuts through the screen. Sorry about the sun on the bottom right. But Highway 101 cuts through the screen. The San Francisco Bay is up at the top. San Francisquito Creek flows this way out to San Francisco Bay.

And the blue areas are the creek floodplain; green areas are the bay floodplain; if you're in a red area, you're in two floodplains. And our projects are to address these floodplain issues and provide other benefits.

The first project we completed was from the Bay to Highway 101. And the objective of that project was essentially eliminate the red or creek floodplain. That project is now completed so the effect is that there's just a Bay floodplain left in this area.

The next project is Upstream of Highway 101. And the impact -- and that's what we're talking about today. The impact of that project is to eliminate the creek floodplain. The objective of that project. And then what would be left is just green, it would all be Bay floodplain.

We have another project to work on the shoreline of the three cities. And we're actually going to start design on a part of that in East Palo Alto and Menlo Park up here shortly.

Just one slide on the project we completed, from the Bay to Highway 101. Here's East Palo Alto homes, Palo Alto Golf Course, there was a massive effort to widen the Creek into the Palo Alto Golf Course, protect against creek flooding and against ten feet of sea level rise above today's high tide.

So that's what the project looked like during construction. This is what it looks like now.

Here's the Friendship Bridge separating Palo Alto and East Palo Alto. We extended it, the Creek, by building a boardwalk. Here's a new island and the new trails. If you haven't been out there, it's probably worth seeing. It's pretty cool.

And so now we're focused upstream now that that project is done.

Here's a different -- slightly different orientation. Here's San Francisquito Creek flowing out to the Bay. Here's Highway 101.

And now that this project is done and capacities have been increased here, the lowest capacity is Pope-Chaucer Bridge. This number refers to the number of cubic feet per second that can pass under the bridge.

Basically in order to -- our objective for the next project is to have everything that passes underneath Middlefield safely contained within the channel all the way to the Bay so that there's no flooding downstream on Middlefield. We won't touch Middlefield Bridge as part of this project, but we will need to address all of these areas that have numbers less than 7,500 actually.

The objectives of the project are first and foremost protection of life and property and infrastructure.

We also have as objectives, important ones, enhancing habitat, creating or optimizing recreational opportunities, minimizing the maintenance of the Creek down the road, and not precluding future actions to increase flood protection.

Fundamental options to achieve that are either contain more water in the Creek through the floodplain area, which is essentially from Middlefield to Highway 101. Or detain water during a storm before it reaches that floodplain area upstream in a basin. Or bypass water around the floodplain area.

So those are the three fundamental options that we looked at when we developed a series of alternatives. And those also are included in all the different alternatives that were proposed after our first group of alternatives were proposed. And that's how we got finally to 17 alternatives which are in the EIR.

The first -- the beginning of the EIR, Chapter 2 takes a look at these 17 alternatives across the top. There's a big table in Chapter 2. And we judge those against those project objectives that we just talked about in terms of flood protection, ecosystem, enhancements, recreation, maintenance, these kinds of things. And I won't -- you can go back.

I won't kind of go into what's in the table, but I encourage you to look at it in the document. It's on pages 2-9 and 2-10 in Chapter 2. That's what the "2" refers to.

As a result of this level of analysis of these 17 alternatives against our objectives was that there are four alternatives that should proceed to an additional level of screening, which we screened against feasibility. And feasibility in terms of cost, logistical feasible and technical feasibility. So essentially what is capable of being built.

For those four alternatives, what came out of that was to look for, in more detail, the alternative that replaces the Pope-Chaucer Bridge, widens the channel downstream, replaces the Pope-Chaucer Bridge and constructs flood walls, or construct one or more detention basins in the upstream areas.

So those are alternatives that are advanced. This is that list of 17. Those are the three plus the alternative of no action or no project, which is required of all CEQA documents, to essentially find out what is the impact of doing nothing.

So, here's another view. And this extends -- here's Highway 280. Here's Highway 101. The Creek runs this way out to the Bay and this talks about the objectives of the Upstream Project.

So in yellow is the area that was built already. The objective of that was to increase the Creek capacity substantially by 4,500 CFS to 9,400. Full capacity. Again with the sea level rise assumption.

That's been built.

So now moving upstream, the objective in this area is increase capacity by 1,700 to 7,500. 7,500 remember is slightly above what the Middlefield Road Bridge has as capacity and that's not an accident.

It's also somewhat of an accident, but that happened to be slightly above the number of the flood of record in 1998. So our objective is essentially to protect people against the '98 flood.

We've been measuring the flows in this creek since 1930. So 89 years of data. And in the 89 -- since that time, since 1930, the 1998 event was the -- had the highest flow. So we feel like it's a meaningful objective to fulfill if we can protect against the largest flow in the last 89 years.

Does that mean we're protecting against all flows? Of course not. But this is a project we can build that we think is achievable.

One second, sir.

In terms of additional protection and what the objective is, if we look at the upstream retention sites, we can detain approximately 1,000 cubic feet per second. Based on doing either a detention basin at Searsville, which would be a Stanford project, or at Webb Ranch, which would be a JPA project, or some combination of Webb Ranch and the former building nursery site. So we evaluated these three potential basins at a programmatic level because we don't consider that achievable in the near term. So it is not part of the project we want to start building right now but we did want to evaluate it so we can increase the project that we're proposing by this additional protection.

If we take the 7,500 and we add a thousand, we get above what the 100 year event is, which is 8,150 at Pope-Chaucer Bridge.

And so that's the way that we achieve our objective of 100-year protection.

Yes, sir?

AUDIENCE MEMBER: What was the flow this year?

MR. MATERMAN: The flow this year? There really wasn't any high flow this year.

AUDIENCE MEMBER: Surprising because we had a wet winter.

MR. MATERMAN: We had a wet winter. It was spaced out. It was -- the largest flow this year might have been in the range of between 1,500 and 2,000 CFS, I would think.

Yeah. The last large flow that we had was February of 2017 and that did cause flooding, just downstream of East Bayshore Road on both sides of the Creek. And that flow was -- 2017.

Anyway, it was -- yeah, the largest flow previous to that was in 2012 in December. That was a pretty substantial flow. That was about 5,400. That was probably the largest since 1998.

Okay. Thanks a lot.

The next slide.

Any other questions at the moment?

So, this is an image that shows the model floodplain based on the 1998 sized event. The yellow circles represent bridges. This is Highway 101, the Creek flowing to the Bay.

This is the Newell Road Bridge. This is the University Avenue Bridge. That is the Pope-Chaucer Bridge and this is the Middlefield Road Bridge. You see breakouts at Middlefield Road, at Pope-Chaucer on both sides, in Menlo Park and in Palo Alto. And then on the East Palo Alto side around University Avenue.

And so this is what it looks like today.

In terms of when we build -- if we build the preferred project, this is what the floodplain would look like.

Yeah. All right. So there we go. And so what we would see is still floodplain emanating from the Middlefield Road Bridge, much less so. Just because if there was an event greater than the -- the benefits of this project are protecting against water spilling out up to the point at which we build.

But also, if you think about it, it is a benefit if it's a flow higher than that, it is less of a flood than it would have been otherwise. So this shows less water actually coming out of Middlefield and certainly none coming out at the -- at downstream of Middlefield.

Kevin, next slide?

So the preferred project in terms of project elements are replace Pope-Chaucer Bridge right here; widen the Creek bottlenecks where the bank on the Palo Alto side or East Palo Alto side is concrete. And that's just upstream of Highway 101, called West Bayshore Road. Here between Newell and University are two spots. And then here, this is Manhattan, just upstream of Manhattan up to about Euclid at -- widen here and then replace the wooden parapet on Woodland Avenue. We'll show pictures or videos of all this.

These are the project elements of the preferred what we call channel widening.

Another alternative we looked is the flood walls alternative. That's to build flood walls, not terribly high, two feet, but over a pretty extensive period of the Creek. And this obviously has a bigger footprint and bigger impact so it is not the preferred alternative.

Kevin is toggling back and forth a little bit just to see the differences between the two in terms of footprint. It does have some of the similar elements like widening at West Bayshore and replace the Pope-Chaucer Bridge. Also, as people may be aware, the City of Palo Alto has a separate project to replace the Newell Road Bridge. From what I understand from the city, they're coming out with their EIR May 31st, so before the end of this month.

PH1-1

AUDIENCE MEMBER: So, the bridge some properties might be --

(Inaudible; interruption by court reporter.)

MR. MATERMAN: That's possible just from this project, because what you're seeing is the floodplain going away.

What -- the way we're going to go about this is if we proceed with the preferred project, we're going to do an analysis of what kind of upstream detention and freeboard might be needed within the Creek to get people out of the flood insurance program.

So at the moment we can't make a commitment toward that, in part because it's not our ability to take people out. It's really FEMA's deal. But we certainly can apply for that. But we would apply for that based on additional information and also including whether upstream detention is going to happen and if so, even then we may need to add some height to the Creek, through a different project, to create freeboard as FEMA says so that people can be removed from --

PH1-2

AUDIENCE MEMBER: Before that --

(Interruption by court reporter.)

AUDIENCE MEMBER: Before that takes place, would some properties come out or not or do you have to take action with FEMA and if that happens --

MR. MATERMAN: What we would have to do is we would have to -- we would have to go to FEMA and get them to certify the completion of the project. And then either we or the property owner would go to FEMA to redraw to get their property outside of the floodplain; right? As you know, there's a process to that and it's not instantaneous.

But that's a separate conversation which we'll absolutely be glad to have because we understand if properties come out of floodplain, regardless of whether there's upstream detention or not or freeboard, that might be the case and those people should be able to save themselves some money.

All right.

So, here's the other alternative, which is upstream detention. A little bit of the detail on that.

Again, Searsville Dam is a project with Stanford where they've said that their preferred project is to put a hole in the base of the dam, excavate sediment behind that and create a channel for fish migration that would also have benefits for flood protection and other biosystems. The potential basins, we looked at creating a new one here at the site of the former Boething plant nursery and at Webb Ranch.

Basically what that means is you take the earth, dig a hole about ten feet deep and it would still have the same functionality that it does today or it could if that's what the University chose.

But it would have an opportunity for floodwaters to enter the basin and exit the basin after a certain point of selected flow downstream.

Okay. So, that -- thank you.

Yes, sir?

AUDIENCE MEMBER: Can you go back to that slide, please?

MR. MATERMAN: Sure.

PH1-3

AUDIENCE MEMBER: Can you talk about the studies that were done at the Searsville Dam and what capacity -- (inaudible.)

MR. MATERMAN: So over the past -- well, over

PH1-3 Con't

the past many years Stanford has looked at this issue.

In April of 2015 they came out with their report that was called the Searsville alternatives analysis and it was produced by a steering committee of the University. And they came out with this preferred project instead of putting a whole new dam and excavating sediment behind that canal or channel.

The most recent analysis by Stanford, more recent meaning throughout 2018, they've been working on the question of -- what you asked, which is what could be the capacity for capturing and detaining water during a high flow event? Their analysis says between 800 and 1,000 cubic feet per second.

AUDIENCE MEMBER: Do you know what the mandate was, what the data requires?

MR. MATERMAN: The mandate? You know, that's really a question for Stanford. It was their study and I can't speak to that.

AUDIENCE MEMBER: How much interaction did JPA have in this study? How much with Stanford? And looking at what you were trying to accomplish, which whatever they are -- whatever their scope was, but what would that then look like?

MR. MATERMAN: Well, there was quite a bit. We met several times -- we met with Stanford several times.

Well, dating back to the beginning of the alternatives analysis, we at JPA, board members and myself, and others. Jerry Herman was a co-chair of the group, and Tom Rindfleisch was involved as well.

A lot of interaction with Stanford in 2013, '14 and '15 leading up to that.

In 2018 most of the interaction was about their -- the consultants' work on sediment, sediment deposition downstream and hydrology. So we met with them to go over their results and have them look at their information in the context of our proposed project.

AUDIENCE MEMBER: Do you know why they're doing this? What was their motivation?

PH1-3
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MR. MATERMAN: Well, so I think Stanford feels like they have a bit of pressure to do something about the dam regarding fish passage. And in order to do the project that they've come out and said is their preferred project, they need to understand what the implications are. So they want to understand what projects are likely downstream and what are the hydrologic and sediment capacities.

So we're going to move forward. If there are other questions about Stanford we can talk about that later.

All right, Kevin, next slide.

PH1-3
Con't

So this is going to be an image, I'm going to talk quickly -- this is video. I'm going to talk quickly through it, but it will give you a sense of the project areas, what they look like today.

So Kevin, do you want to start it up?

So we're zooming in and these are the project components that I went over, West Bayshore between University and Newell. And then upstream University and Pope-Chaucer Bridge. And we're going to take these quickly one at a time. A little video tour.

So this starts at West Bayshore Road and what we'll see here is where we're doing widening. It's all on the Palo Alto side, which is on the right side. And it's to fit the creek channel to that fourth bore right there which currently is closed but can be and should be open and it will be widened here to the property lines. So all of that sack concrete that's there.

As we go upstream it's still sack concrete in the widening areas, some on the Palo Alto side again. So it's this area. And we go essentially to the line of property. It's all of this area that we would widen or take out the sack concrete, some earth behind it, and create a soil nail wall. And we'll show you what that looks like. Same widening on the Palo Alto side where there's sack concrete. These are Palo Alto backyards

PH1-3
Con't

here and all in this area.

And then when we get to University Avenue, we get to that wooden University Avenue Bridge parapet. And it's extended and East Palo Alto put this thing in in 2013 after it flooded right here in this area, it spilled over onto the street. So we will be replacing that.

And then this large concrete structure is on the East Palo Alto side. We'll remove that. Which is right here.

And then just upstream of there, I'm sorry, just downstream of there, and upstream, actually, we will be removing sack concrete on the Palo Alto side.

And this video will take us -- we don't go all the way to the bridge, but we're pretty close to it.

And then as we go to Pope-Chaucer, you can see that the bridge is essentially a roadway. But under the roadway, as you may know, I'm sure you do, is a concrete culvert that has a concrete bottom as well. And occasionally sediment gets deposited on that bottom, but it's still really just a concrete culvert. And all of this needs to be removed. And on top of that culvert there are trees growing out of it and we'll talk about that later.

So those are the project elements in the proposed project.

PH1-3
Con't

Here's Pope-Chaucer, the upstream face of it.

This is the current Pope-Chaucer Bridge, the upstream base. And this is what the new bridge we're proposing to replace it with. This is after about two years -- one to two years, let's say, of plant growth. And it includes these pools at the bottom. Currently, as I said, it's really just a concrete bottom of channel under the bridge. Now we will build these pools to enable fish migration. And as you can tell, there's going to be a lot more capacity under the bridge.

Kevin.

So this is, as I said, what channel widening looks like. This is currently what the sack concrete area looks like. This is an area that actually would be widened in Palo Alto. This is what it looks like in a drawing. We have the sack concrete and you have earth behind it and Palo Alto backyards here.

And as Kevin advances the slide, excuse me, you will see what happens here in terms of what it looks like in the future.

So all of that is the widened area. The reason that we can't just do an earthen bank behind it is there's not enough -- with the Palo Alto backyards, there's not enough room to kind of slope a bank back. So we will put a wall here and we plant some vegetation in

PH1-3 Con't

front of it and on top of it and that's how we get our widening in those areas.

Okay. So, the EIR in terms of impacts and mitigation. There were 15 categories that we looked at. They are in the box below from aesthetics to utilities and they were characterized as either having no impact -- the project was characterized for each of these as either having no impact or less than significant impact, or significant impact that could become less than significant impact with mitigation or as significant and unavoidable impact with mitigation.

In terms of significant and unavoidable impact from the project-only perspective it's noise during construction. In terms of cumulative impact of the project on other sources, especially Highway 101, it's air quality during construction.

So we didn't find any significant and unavoidable permanent impacts but these two during the construction period.

In terms of significant impacts that could be made less than significant with mitigation, there were a bunch of them. And those are in the categories that are in purple on the top half of the slide. And listed during construction in all those categories. And you would have to go through the document to kind of -- if you're interested in one of these specific categories or one specific area, you can find that in the document.

Permanent impacts to biology, geology and hydrology that could be made less than significant.

Trees. I know that's an issue that lot of people are interested in. And it's something that we're interested in too. And we've tried as much as we can to reduce the impacts to trees. And we'll talk about it.

PH1-3
Con't

But, this project will impact trees. And there's no getting around it. When you replace a bridge that has a whole bunch of trees growing out of the top of it, those trees go. And so we mitigate that by planting new trees, a lot of them, and trying to reduce the impact to trees. But I think it's only fair to come out and show you and say what we're talking about.

So in these areas, there will be vegetation impacts. All of these areas are not in the City of Menlo Park except Pope-Chaucer, so we'll zero in on that a little bit on the next slide.

As I said, trees removed during construction will be replaced and we'll be working with the cities and arborists on that. As well as on protecting them.

So this is a little specific to Menlo Park. This is an image that shows -- here's the Pope-Chaucer Bridge, here's Pope Street, here's Woodland Avenue,

PH1-3 Con't

Chaucer Street. And I wanted to kind of focus in, this is an area that I mentioned before is kind of on top of the bridge culvert. And I thought it would be instructive to show what this looked like about 25 years ago.

So, for those of you who have been here, you know that was a road right there; right? And for whatever reason -- it was before my time on this project -- that road was closed and trees were planted. And that's a great thing. But it's still a road on top of concrete and that concrete is part of a bridge that needs to go. So that's kind of where we wanted to point out to explain where that's coming from, that part of the project.

And these are two other images which you're probably familiar with. This is the downstream face of Pope-Chaucer Bridge as well and this is the area we'll talk to you about later.

Trucks and traffic. So, we have all these different impacts, categories of impacts, significant, unavoidable, things that we think we can make less than significant and we really wanted to focus in with this meeting on trees, trucks, traffic, and noise because those are the things that we think you would be most interested in. If you have to dive into something else

PH1-3 Con't

you are welcome to.

Yes, sir?

AUDIENCE MEMBER: Regarding trees, the ones on the bridge are going to be removed. How about upstream and downstream?

MR. MATERMAN: Yeah, it's really just -- just. There's a little bit of that. It's really just in the footprint of the work of the bridge.

So, what do we have that might be good for that?

Do you want to go back one, actually? I think we'll just use -- well, there we go. Okay.

PH1-4

So, to try to answer that question, so here's obviously the bridge; right?

The footprint of the bridge -- of the project, of rebuilding the bridge, extends out to about here, okay. And on -- on Pope. And on Chaucer and it's also about the same.

So it's less than the whole distance of the bridge, maybe by half, but there is some extension. And that's because when you're regrading the roadway, the grading has to continue out. You can't just suddenly stop at the end of the bridge.

That also continues here probably about to there. Only because the concrete part of the bridge, you

PH1-4 Con't

know, it's curved; right? As you can see here, it's curved out. And you saw before, the roadway goes this way. So it curves out and it ends there and then it ends there.

So the trees impacted would be there, which we talked about. It would be here, which are also growing out of the concrete of the bridge, right there. And then it would be ones on the street side here, here, up -- before the word "Pope" it would stop. But up here, here, and similarly on those sides. So maybe half the length of the property, something like that.

And then those, of course, would all be replanted.

PH1-5

AUDIENCE MEMBER: Can you go back to the grading? The one with the new bridge shows the bank quite clear for a distance. Why is that?

MR. MATERMAN: Okay. Do you want to pull that up? Because I'm -- so --

AUDIENCE MEMBER: That looks very much clearer than -- how --

MR. MATERMAN: Clearer in what sense? I'm sorry.

AUDIENCE MEMBER: Much more space. I don't know how far from the end of the bridge Palo Alto has, but --

PH1-5 Con't

MR. MATERMAN: I'm not following the question.

AUDIENCE MEMBER: I mean this looks very much more open and seems like there's maybe fewer trees.

MR. MATERMAN: Okay. Well, I mean, this is a rendering; right? It's not supposed to be -- to describe exactly every tree at every location. It's a rendering.

And so, you know, maybe that could be a comment of yours is that either the project or the renderings of the project don't capture what you would like to see in terms of trees.

Yes, ma'am?

PH1-6

AUDIENCE MEMBER: How much higher is this bridge than the one that's there today?

In other words --

MR. MATERMAN: The roadway?

There's not a lot of grading. The roadway is -- it does go up just because you can't stop the bridge right at the creek bank. But the roadway is six inches higher.

AUDIENCE MEMBER: Six inches higher than --

MR. MATERMAN: The new roadway as opposed to the old roadway.

Yes, sir?

AUDIENCE MEMBER: I think that slide is very useful. It would be useful also to have an aerial view

PH1-6
Con't

of the exact same slide.

MR. MATERMAN: Yeah. In the -- you mean an aerial view of the new bridge, the proposed bridge? Or do you --

AUDIENCE MEMBER: Yeah, but in the presentation.

MR. MATERMAN: Okay. All right. Yeah. We'll include it. Yeah, thank you for that comment.

We do have it on the board, but right, we can include it.

Yes, sir?

AUDIENCE MEMBER: In that rendering of the new bridge versus the old bridge, it's a little unclear as to where Woodland is and where Palo Alto Avenue is in relation to where the bridge starts and stops.

If I'm making myself clear. Can you pull that slide up again? The rendering?

Yeah, that one.

So on the left, Woodland Avenue presumably is where it says "Menlo Park?"

MR. MATERMAN: Right.

AUDIENCE MEMBER: And Palo Alto Avenue is on the right side.

But how close to the start of the bridge are those two streets?

PH1-6
Con't

MR. MATERMAN: How close to the start of the bridge are the two streets?

AUDIENCE MEMBER: In other words, okay, if I'm driving in this direction and I'm going to turn right onto the bridge off of Woodland Avenue.

MR. MATERMAN: Okay.

AUDIENCE MEMBER: How abrupt a turn is that? How tight a turn is that?

MR. MATERMAN: I think I know what you're asking and -- go ahead.

MR. NYGAARD: Maybe I can help out with this. My name is Russ Nygaard. I'm with a company named NV5. I'm the project manager for the bridge replacement project. We're designing the bridge and roadway work right there.

So, to answer your question, and basically both questions of how wide that is and how open it is versus the roads, you can see on the left-hand side underneath the words "Menlo Park", that is the road on the left-hand side.

And as you turn that corner, the road geometry does not change very much from what it is today. So the abutment is sitting about ten feet from the road.

Same thing on the right-hand side, on the Palo Alto side, you would make that same corner that you would today. The road is now wider and has some different features to it, but as far as making the corner from the current intersection, that current intersection on either side of the bridge is very similar to what you see today.

AUDIENCE MEMBER: Okay.

PH1-6
Con't

MR. NYGAARD: To answer the question about the trees and the openness, to give you a good idea of up above where you see the arch, down below where you see the two piers, on either side of the Creek, that's basically the same width as the arch. A little bit different, but not a lot.

And then -- now it's enclosed and creating a big -- basically almost like a dam for the bridge -- for the Creek, is now opened up by laying those back, by making a bridge instead of a culvert.

So there would be some -- like for instance you see a tree right in front of the retaining wall on the picture above that's not there because we're opening up the Creek in that area to reduce that flood potential.

But that's what -- to give you an idea of what the difference is between the culvert there today and the bridge of the future, think of that opening being the part in between the two piers below.

PH1-7

AUDIENCE MEMBER: Where it says "proposed", right now there's a huge bay laurel tree that looks like

PH1-7 Con't

that's going to be sacrificed.

MR. NYGAARD: We're actually working to try to save any large trees. We're viewing another change through the geometry and work on the road to try to save trees right now, to try to lower -- anything we can to lower the road down before it does anything.

PH1-8

MR. MATERMAN: Yes, ma'am?

AUDIENCE MEMBER: I heard the word "retaining wall". Is that what's showing down there on the -- is that a retaining wall?

MR. MATERMAN: I'm sorry, can you repeat that?

AUDIENCE MEMBER: Is that a retaining wall? I heard you mention a retaining wall.

MR. NYGAARD: On the current one what I was calling the retaining wall is that part that is that big gray area --

MR. MATERMAN: I think she's -- he's talking about right there.

MR. NYGAARD: And also going off to the right.

AUDIENCE MEMBER: Will there be a retaining wall?

MR. NYGAARD: No.

MR. MATERMAN: Yes, sir?

AUDIENCE MEMBER: I think the report has language saying that -- kind of made me think maybe trees

PH1-8
Con't

have been removed. Can you provide some specifics? That would be great.

AUDIENCE MEMBER: We can't hear the question.

AUDIENCE MEMBER: I said the report said something about replacing -- planting many trees to replace ones that were removed. It made me think they were removing a lot of trees. It would be better to put a number on it, if it's 10, 20, 50, to be more specific.

MR. MATERMAN: So there's a table in the report that lists for the Pope-Chaucer part of the project the exact trees that would be removed, type and number of each type.

Maybe we'll get the page number and table number on that to give you that tonight.

I'm going to show the --

Yeah, go ahead, Tom.

AUDIENCE MEMBER: I have a question. The trees are growing over the culvert, presumably the roots are not bound. Is it possible to move those trees, put them somewhere else? Those oak trees and other kinds of trees. And would it just be easier to move them?

MR. MATERMAN: So we looked at that and we talked to arborists about that and we're going to try to do that where it is practical and where the species will survive. So that's on the table as an option. Other

PH1-8 Con't

than planting a much younger tree. Obviously it would be nice to have the mature trees just moved.

Question in the back there?

AUDIENCE MEMBER: You seem to have fair amount of work done in the design of the bridge; is that correct?

MR. NYGAARD: Yes.

AUDIENCE MEMBER: Is that accessible? Can we look at that?

MR. MATERMAN: Alec?

MR. NICHOLAS: Let me get back to you on that.

MR. NYGAARD: Let me explain why I said yes.

PH1-9

There's a certain amount of work you have to do in bridge design in order to support an environmental document so that they're able to take a look when they're doing their environmental work on what the impacts are. Things like: Do you need to have piles or not? What's the size of the bridge? Those sort of things you have to answer in order to make the environmental document relevant.

So we've done enough to go through that to support the environmental work that ICF has been doing, where we're at right now.

As the environmental document is certified, that then gives the green light to go forward and complete the actual design work. So there's still a lot to be done afterwards, but we needed to get far enough along to support the environmental document so that we can say with honesty we know enough about the design to say that rendering is consistent with what we expect to be able to put in the final design.

AUDIENCE MEMBER: But you would make that available?

MR. NICHOLAS: At some point in the future, of course. It's going to be a bid to the contractors.

PH1-9
Con't

AUDIENCE MEMBER: You talk about the grading coming down. So obviously there's work somewhere on that. Can we have access to that?

MR. NICHOLAS: I cannot answer that right now. But we'll connect.

MR. MATERMAN: We need to move on.

Susan?

AUDIENCE MEMBER: Quick question. Do you anticipate there's a --

MR. MATERMAN: You've got to speak up.

PH1-10

AUDIENCE MEMBER: Do you anticipate there's a chance of sediment accumulating behind the sides there of the supports for the bridge on each side?

MR. MATERMAN: Yeah, so what she's asking about, all of this right now that I think was in reference to the gentleman's question about a lot more space, all of this -- not all of it, but a fair amount of it is sediment that's been built up behind this culvert over decades and that won't be there.

So the question is what kind of sediment deposition do we expect at the bridge?

Kevin, do you want to try to catch that question?

PH1-10 Con't

MR. MURRAY: Yeah. In general, the sediment models that Stanford has produced as part of their Searsville work suggests that this is not an area of deposition. And the cross-section that these piers present, meaning the face of the piers as water hits it, is pretty narrow. So we might expect just very small, maybe inches, of deposition of sediment at those locations. But that's going to be mobilized very easily every time we have a big flow.

So there might be little bits of sediment here and there, but we don't expect to see the channel bottom raised appreciably during -- as a result of this -- some sort of hydraulic constriction as exists today.

AUDIENCE MEMBER: Okay. What is the channel bottom? Is it just going to be dirt? Or is it --

MR. MURRAY: So as it's shown in this rendering, it's primarily rock. But it's not easy to see. If you look directly below the deck of the bridge, there's a darker area. And if you look just a little further upstream, you will see where it is lighter. That indicates that there's a shallower berm, what we call a riffle. And then there's a deeper portion that is actually another pool.

We would expect some sediment to settle out into those pools. So it's going to be more of a natural bottom within the low flow channel, the effective low flow channel. But it wouldn't be -- like if you look down there today, it looks like a beach, that bottom channel of the Creek is dry.

PH1-10 Con't

It will be a lot more -- it will be a lot more detail, a lot more roughness to the bottom. It will look more like the natural creek channel.

AUDIENCE MEMBER: I had a question about the performance of the bridge during high water, in particular the piers.

In past high water events, the Pope-Chaucer Bridge was a constriction point, particularly when there were whole trees down in the Creek. There would be people literally pushing them through.

What consideration has been given to this design as to whether this may be trapping structures that will present a problem in terms of debris buildup and potential flooding?

MR. NYGAARD: That's a two-part answer. One is the structure side that I can answer. Obviously we designed the structure to account for the loads that can happen in a river setting.

The hydraulic side of it would be the other piece of that in terms of what's looked at in terms of any backup that could occur because of trees or anything that gets stuck there.

This, the flow -- this carries the 100-year flow. We are above that, so that we should see anything coming down wash through.

PH1-10
Con't

AUDIENCE MEMBER: Does that assume there won't be trees backing up against it? Trees coming from upstream? There's a lot of vegetation in the stream, including large trees

MR. NYGAARD: Len can talk to the hydrology.

MR. MATERMAN: I guess I would say that there are a lot of large trees upstream and we do find them at Pope-Chaucer occasionally. In fact, this winter season there was a big one that obstructed and that set off the creek monitor. You would have seen that if you were watching during that storm.

We anticipate that this structure will have less of a problem with that in the future. But we're not going to promise that trees aren't going to get stuck if they're large enough to fit beyond the length -- between the two piers.

So, it's still something that we need -- the cities will need to adaptively monitor and manage. We cannot build a bridge that would obviate the need for monitoring.

AUDIENCE MEMBER: I appreciate that, but the part of the project that would ensure the stream is clear of trees, the creek -- the level of the creek beds are probably not very ideal.

MR. MATERMAN: Right. Right. I mean that's a different issue that we struggle with every year in terms of vegetation that's dying or dead and what are allowed to by regulatory agencies to go in and deal with. That also is habitat.

PH1-10
Con't

So I would encourage you to make a comment about that and maybe we can talk about that at a different point.

So we want to try to get through the presentation so we can turn to public comment. And so we'll do that.

And where are we at? Traffic and trucks.

We looked at several intersections. All the ones indicated with a circle. Only -- in terms of the

PH1-10
Con't

closure of the Pope-Chaucer Bridge, we're anticipating eight to nine months of closure and so the one that showed the significant impact was on both sides of the Creek at Middlefield Road.

And to address that impact, the EIR proposes that we put in a temporary traffic light. We are talking about the City of Menlo Park that's very interested in the problems at that intersection anyway, the backups at Willow and Middlefield on the Palo Alto side. And the reason it's red is because it's a problem anyway and our project would make it worse.

So the City of Menlo Park is looking at that. And we're talking to City staff about kind of the future of that intersection and how this project may help the City or the City may take care of the issue separately coincident with the project.

So that's the traffic.

In terms of trucks, during the construction of any feature there's going to be truck traffic. Maximum traffic we anticipate is 60 trips per day including trucks and workers at each of the features.

And "feature" meaning a widening site or Pope-Chaucer Bridge.

The largest anticipated number of workers at any point would be at the bridge and that would be 20

PH1-10 Con't

workers.

And that channel widening would require the most haul trips as opposed to the bridge.

And in terms of the routes for channel widening, it's not surprising that we want to get trucks off Highway 101 and it's either through University through all of this widening work or Pope-Chaucer Bridge or Embarcadero Road or the work that's going on at West Bayshore Road. So there will be truck traffic.

Noise, it's really dependent on how close you live or work to the project features that would be constructed. We're very conscious of the noise concern and vibration. And we're looking at new approaches to the construction, particularly the Pope-Chaucer Bridge, that might reduce some of the noise levels that are indicated in the EIR. But we wanted to put out kind of what we thought was the worst-case scenario and leave that as the impact. And then if we can improve upon that, which I think we're pretty optimistic about that, that we can reduce that noise level.

Sir, did you have a question?

PH1-11

AUDIENCE MEMBER: Yeah, if we could go back one slide on the traffic situation. For the replacement of the Pope-Chaucer Bridge, the access point, as I understand it, is upstream of the bridge. So, where are those trucks going to go at the end of the day and by what means? What route are they going to take?

MR. MATERMAN: Yeah, thanks for that question. I forgot to mention that. That's an important point.

So, for the construction of the bridge, the access is about five houses upstream of the bridge on Woodland Avenue, and so trucks would enter there and all the work -- all the truck-related work would be there within the channel.

So in terms of access to that, I can't actually answer that question. But is there anybody else who can?

MR. MURRAY: I was going to ask you to clarify.

PH1-11 Con't

Are you talking about the route in and out? Or how you get to the freeway?

AUDIENCE MEMBER: Our house is on Woodland Court which is upstream of the bridge. I'm wondering: Are we going to have a bunch of trucks coming by on their way and either out to Middlefield Road or Laurel or any of the other streets? Those are really the only two that feed Woodland Avenue.

MR. MATERMAN: Yeah, well, no, the truck traffic would not go that way. It would either go -- it would go down Woodland and then either to -- I believe, based on what the document says, that the anticipation is to go Woodland Avenue to University Avenue. But they wouldn't take Willow Road as an egress or access road.

AUDIENCE MEMBER: So they would drive down the creek bed?

MR. MATERMAN: No, drive down Woodland and they would come back out --

AUDIENCE MEMBER: How would they get there if the bridge isn't there?

MR. MATERMAN: They would get to the site from Woodland Avenue.

(Inaudible comment.)

MR. MATERMAN: Oh, how would they get into the creek bed?

PH1-11 Con't

Yeah, this gentleman is correct. There's actually already a ramp that exists. You can't see it. But there's a ramp into the Creek that exists, it's about five -- as I said, it's across --

AUDIENCE MEMBER: That's upstream.

MR. MATERMAN: Yeah.

AUDIENCE MEMBER: Right. All right. I guess I'll talk to you after.

MR. MATERMAN: Okay. So we're almost done. We were talking about noise, I think.

And now we're looking for new ways -- or a different way than what's indicated in the document to construct Pope-Chaucer.

This is just the last slide. This is a summary slide of what we're trying to achieve. So the project in yellow is done. Again this is the 7,500 cubic feet per second, 1998 event.

Estimated completion, December 2022.

And then the intention after that would be to achieve the greater-than-100-year event.

PH1-11 Con't

AUDIENCE MEMBER: There's no reason that that ramp has to be used. It's just a cut-away in the side of the Creek. You can access anywhere you want to get to that bridge. You don't have to use that old ramp that is just dirt. It just happens to be there from when they built the bridge originally. You could access from other locations that may not be so close to somebody's house. You might look at that so that it's not as impactful to someone's house in particular.

It's right next to my house. I would not be very happy with having the trucks going in and out. I wouldn't want that to be at someone else's house either.

But you might look if there's a better location that's not as impactful to someone's house in particular.

MR. MATERMAN: Okay. I think we're getting to the public comment period, which is great, because that sounded like a really great public comment.

So did you get that?

PH1-11
Con't

THE COURT REPORTER: I did.

MR. MATERMAN: Thank you for that. We feel your pain. And we're talking with the City of Menlo Park starting actually a few hours ago about how to reduce the impact if, in fact, we choose that ramp to the people that live along Woodland Avenue between Laurel and Pope.

Yes, sir?

AUDIENCE MEMBER: Running a bunch of trucks --

MR. MATERMAN: Speak up, please.

AUDIENCE MEMBER: Running a bunch of trucks on Woodland is going to make a really horrible traffic problem worse.

So, do you have any comments on how you're going to deal with that?

The section of the road you're planning on using often backs up completely from University all the way to Menalto.

So is there any effort to mitigate that or understand that or stop commuters from using that road? Or -- I mean --

MR. MATERMAN: We can look at using Gilbert and Willow.

Is that what you would suggest?

AUDIENCE MEMBER: Oh, yes. I think so, yes.

MR. MATERMAN: Okay.

MR. MURRAY: We took that as a public comment. One comment in the construction logistics, we can include in the specifications a note that the contractors should use a certain time period when there's no commuters on that road to do the majority of their construction traffic hauling. And usually a contractor can find a way to accommodate that. So that's one way we can mitigate that impact.

PH1-11 Con't

But I do believe you wanted to make that as a public comment, not a question-answer. But I wanted to offer up that.

MR. MATERMAN: Fair enough.

Yes, sir?

AUDIENCE MEMBER: I wanted to ask about how to read the DEIR. I looked at 880 pages. I was trying to download it. I could see all the alternatives. It wasn't clear to me where the recommended alternatives were. And you made reference I think to Table 2.2 and so forth.

PH1-12

But I've seen two separate numbers -- sets of numbers. One was that it was Alternative 2, 3, 5 and 15.

And somewhere else you showed 1, 2, 3 and 5.

What are actually the numbers of the alternatives that are being recommended?

MR. MATERMAN: Okay. That's a fair question.

And I'll try to answer that. Maybe Aaron can jump in too.

So, right. There are 17 alternatives and they all had numbers. As quickly as possible, we tried to go away from numbers to names. And I would encourage you, if you're looking at -- and that's in -- at the end of Chapter 2.

So Chapter 1 is Introduction. It summarizes kind of the big picture on why we're doing this and the big plan of all the projects and how this one fits in with other projects.

Chapter 2 is called Program Description.

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Con't

Chapter 1 also has a summary at the end of it, but Chapter 2 is Program Description where we dive -- there's a description of each alternative, a paragraph or two at the most. Then goes into the tables which cull down from 17 to 3. And then it goes into a deep dive, especially on the preferred alternative.

At the end of that -- or at the beginning of that description of the preferred alternative, that's when we go away from the numbers and we call it "channel widening," "flood walls," or "upstream detention."

And then Chapter 3 takes those and looks at all of those different factors like aesthetics and air quality, biology, blah-blah-blah, against those three alternatives.

So I would encourage you, if you can make it through Chapter 2 in terms of the numbers, and I appreciate the fact that there's some confusion there. It's called "channel widening" from then on and that's all it is, channel widening. And so I think that's probably the way to think about it.

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And if you want, myself or Kevin or Tess, JPA folks, we can flip through the pages of the documents with you and go through that and make it clear. We definitely want that to be a clear aspect to it.

Aaron, do you want to add anything?

Yes, sir?

AUDIENCE MEMBER: Yes, I'm Steve Schmidt. I was on the City Council when the flying right at the Pope-Chaucer Bridge was eliminated and the trees were planted in the park.

The inclusion or the assertion that tree removal is an unavoidable but mitigatable impact, I think for a lot of us here, is a little misleading.

PH1-13

For me, certainly, it's a permanent removal of a lot of trees along the Creek. And I think for a number of people it would seem -- a number of people here tonight -- it would seem that way too.

So, given all the -- given the tree removal and disruption of neighborhood tranquility and cutting off the bridge for eight months, it seems to me that the proper approach would be to do -- to exhaust all the upstream detention possibilities before doing anything else on the lower reaches of the Creek.

From the numbers that were shown, it looks like upstream detention could do the reduction of something like 1,800 CFS. That comes pretty close to the capacity of the Pope-Chaucer Bridge.

So, I would encourage you and everyone else here to think about that as a viable alternative ahead of doing this downstream work. It's much less disruptive and destructive of the environment that we've all worked pretty hard to achieve in this area along the Creek.

PH1-13
Con't

MR. MATERMAN: Yeah. Thank you for that comment, Steve.

I guess there are really two principles that guide our work. We want projects that are meaningful and we want projects that are achievable in the near term. And this month is the 20th anniversary of the creation of the JPA. And it's the 21st anniversary of the flood. And I don't think any of us wants to be having this conversation years or decades from now. And so on the achievable score, that's why we really did focus in on the preferred project as something we have more control

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over.

We believe it is permittable, fundable, but, you know, your comment is a fair one. And we've thought about that a lot and tried to accelerate upstream detention as much as possible. We certainly will do that as what we hope is the preferred project moves forward. Your comment is well taken.

Anybody -- everybody's talked before.

Yes, sir?

PH1-14

AUDIENCE MEMBER: I would like to just go back to what Steve was saying. You have 8,100 on the Pope-Chaucer Bridge. 8,100.

MR. MATERMAN: 8,150, yeah.

AUDIENCE MEMBER: 8,150. You already have detention of 1,500.

MR. MATERMAN: When you say already, tell me what that means.

AUDIENCE MEMBER: You've got planned for. You have Stanford --

MR. MATERMAN: That's -- the potential is there. I would say the potential.

AUDIENCE MEMBER: So you're looking at 1,000 -- 1,000, more detainable.

So I want to go back and talk about the work that's been done at Stanford and why JPA was involved with them in increasing that detention.

MR. MATERMAN: Well, I think I described -- Hold on one second.

I think I've described what we've -- our interaction with Stanford over several years. It's -- that is a viable comment that the focus of the project should be upstream detention. And we take that.

Whether we think that's achievable in the near term, that's a different question. You know, maybe you disagree. But I don't think that our ability to force Stanford to do a project or ability to force Stanford to let us do a project is going to happen by 2022. I just don't see it.

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And you know, we can disagree about that.

AUDIENCE MEMBER: Why do you think that?

MR. MATERMAN: Because that's what I see as a realistic timeline by which we can finish the project here to provide flood protection for this area. That's 2022.

Did you want to make a specific comment about that?

AUDIENCE MEMBER: Yeah, I just wanted to comment that when you look at upstream detention and compare it to the capacity of the Creek, those are very different types of measures.

If you increase the capacity of the Creek, it carries that water out as time goes on. With upstream detention, the water will accumulate.

Prior analysis also shows that the amount of the upstream detention that would be needed without these measures that are being proposed here would be astronomical.

I'm not going to go into the details of that right now, but that analysis has been done. And so to make the upstream detention a realistic contribution to the flood control, you still need to do these measures in the channel, in this area that we're talking about.

PH1-14
Con't

AUDIENCE MEMBER: And the hydrology that you are talking about is available. When you say "astronomical," astronomical is a very big number.

AUDIENCE MEMBER: You know, people have been working on it for the last 20 year and some of it is available, yes.

MR. MATERMAN: Tom, do you have a point on this specific --

AUDIENCE MEMBER: Yeah, I would add one argument to increasing the downstream capacity that we have talked about.

Climate change and one of the consequences of that is more and more extreme events. And upstream detention is calculated based on the hydrograph profile and there's no guarantee in the future that that's going to be typical.

And as pointed out, if downstream you increase the capacity, you can flow all day long independent of what the storm profile is. But that profile, that's at a rate that is different than capacity.

So, I feel quite strongly that as a technical issue, increasing the downstream capacity as much as we possibly can is the most practical thing we can do right now.

MR. MATERMAN: Okay. Other comments?

Yes, ma'am.

PH1-14
Con't

AUDIENCE MEMBER: Yes. Have you addressed the problem of the University Avenue Bridge? Because water was backing up from there during the flood for several blocks.

MR. MATERMAN: I'm going to ask Kevin to answer that.

MR. MURRAY: So the big concrete construction, concrete terrace that we showed a slide of that had all the graffiti on it, a couple people walking in the channel, that actual contributes greatly to that backup. And we found that while University Avenue Bridge doesn't have, you know, enough capacity to pass the

PH1-14 Con't

100-year-flow, for example, but removing that concrete terrace and setting that bank back, that takes care of enough of the problem to alleviate the overtopping problem that you're describing.

So, it's a much better -- it's a much less impactful, much more restorative action to take than to replace the bridge.

AUDIENCE MEMBER: Because the constriction there was enough that the flooding was within two blocks of the Pope Street Bridge.

MR. MURRAY: Yes, and our flood maps indicate that.

AUDIENCE MEMBER: Yeah. That was all flooded.

MR. MURRAY: Yeah.

AUDIENCE MEMBER: So, I mean, downstream has to be taken care of first, seems to me.

AUDIENCE MEMBER: The project they're going do, remove that structure and widen the channel. That's what you're talking about, you're talking about the backup at University?

AUDIENCE MEMBER: Yeah.

MR. MATERMAN: Yes, sir.

PH1-15

AUDIENCE MEMBER: I wanted to ask about the base of the channel, which is shown as rock in the renderings.

MR. MATERMAN: At Pope-Chaucer Bridge you're talking about?

AUDIENCE MEMBER: Yes. Two questions about that.

One, how do you clean that? Or how do you take some sort of earth-moving device or something to clean that out, the sediment out between the rocks and so forth?

And two, as part of the DEIR, how do we know the rock will actually be the surface as compared to, say, what they've done in Palo Alto where they've channelized everything with concrete?

PH1-15
Con't

MR. MURRAY: Is that a question you want a response to?

AUDIENCE MEMBER: In other words, I don't know to what extent is this a commitment that it will be rock?

Or are we then going to sit here and say this is a minor change to the project; it is going to be concrete all the way?

MR. MURRAY: The first question, the intent is to design the channel such that it provides kind of a maintenance-free sediment transport function.

So there will be sediment that falls out as water velocity is decreased during big flows. And as water velocity increases, some of that sediment will get kicked up and moved to the next pool.

We will inspect those pools every summer when it is dry. There may be need to do some sort of adjustment, but these have been built in several locations all across -- well, several countries. We know how to design these pretty well. So you are --

AUDIENCE MEMBER: You don't expect an ongoing maintenance need?

MR. MURRAY: No. Maybe in the future, but this particular stretch of channel should not need it because we know a lot more about the design now.

PH1-15 Con't

As far as the second question, changes in future design, there could be small changes to the design. I can almost assure you that one of the changes won't be that we're going to channelize this creek. We would never be permitted to do it by the regulatory agency even if we want to. We now know that's not the proper approach to design these types of projects because they just don't work well over time.

And so it's -- I would say unlikely, but really impossible for anyone to suggest that we would actually -- that we would actually change it to a channelized creek bottom at this point in time.

MR. MATERMAN: I think it is --

AUDIENCE MEMBER: A follow-up question on the same thing.

Again, you don't expect to do maintenance on the floor of the channel in that area, like underneath the bridge every year, for example? It used to be --

MR. MURRAY: If we do any maintenance in that area, it will most certainly be vegetation maintenance.

AUDIENCE MEMBER: Like removing vegetation off the floor?

MR. MURRAY: If there are fallen trees, for example.

PH1-15
Con't

AUDIENCE MEMBER: Nothing where you take earth movers --

MR. MURRAY: No, no.

AUDIENCE MEMBER: Follow-up on that question. Do you have an example of another creek where it has this same situation?

MR. MURRAY: Yes, I can give you examples of several.

If you want a local example, one that just comes to the top of my head Guadalupe Creek, South San Jose. Very similar sized channel. Similarly had flooding problems in the past. They did a lot of channel work that we're proposing to do here.

AUDIENCE MEMBER: By the airport?

PH1-15 Con't

MR. MURRAY: Actually south of the airport. Yeah, upper Guadalupe Creek, not the river. You may be familiar with the river section. That is one of the tributaries upstream and they did a lot of the features that we're proposing. And we've got documentation from our colleagues at the Water District post construction, two years after what the channel looks like after certain flows. So it is pretty well documented.

PH1-16

AUDIENCE MEMBER: Am I correct in assuming that the -- whatever construction is happening is going to have to happen during the dry months?

MR. MURRAY: Uh-huh.

AUDIENCE MEMBER: So what happens if the work continues beyond one dry period and we have to wait until the next? Will we still be without the ability to cross over the Creek and get to, say, from Pope to Chaucer and vice-versa?

MR. MURRAY: That's a good question.

Do you want to take that?

MR. MATERMAN: So the question was? Sorry.

MR. MURRAY: The question was if we spill over on construction.

We have a nine-month construction window during the dry season. Two reasons for that.

One, because we're not allowed to work in the channel because this is a migratory corridor, migrating upstream spawn, this is the season for them going back out to sea later in the fall and so we're required to do this work during a certain window in the summer months.

Secondly, even if the fish wasn't an issue, it's just a lot easier to work in a dry channel, because it's a water channel and you build something when it is wet --

AUDIENCE MEMBER: But this past winter the rain started in October and we're continuing through the last two nights.

PH1-16
Con't

MR. MURRAY: We have a contingency water plan. We have to go by several agencies to move water around the construction site.

If we get to the point -- first of all, our contractors will know what their window is and they will be -- give us assurances that they can meet that target date.

If we get close and we need a little more time, we do have the capacity to ask for an extension from the agencies to continue work. Typically, most agencies in most situations would rather grant small extensions so we can complete our work than for us to come back the following year and do a full year of construction, because that's another full year of impacts to the resources that they are responsible for protecting. So we strongly believe we can get it done in nine months or slightly longer than that if needed.

MR. MATERMAN: We looked at the option of not closing the bridge and working around it, but it would be much longer than nine months. It would be, you know, a much longer period because if the contractor would keep part of it open, you have to deal with traffic while they were trying to rebuild part of it. Better to do it as quickly as possible and close the road.

At least that's what we've proposed. Comments are welcome.

PH1-16
Con't

AUDIENCE MEMBER: Completing the bridge would be the last element of the project to be completed? That would be December 2022?

MR. MATERMAN: That's our objective right now, December 2022.

AUDIENCE MEMBER: The bridge is the last thing to be completed?

MR. MATERMAN: Correct.

Now, it can be simultaneous to other things downstream. But it can't be in advance of the things downstream. So there could be other project elements going on at the same time.

I wanted to bring this slide up to emphasize a point that I don't think I properly emphasized. And that is, you know, we've been talking a lot about impacts. That's the purpose of the meeting. So that's good.

But essentially what we did with this project, we said we want to replace the Pope-Chaucer Bridge because that's the lowest capacity in the channel. And we want to do it such that it can take anything that could come under Middlefield Road Bridge, but we don't want to change Middlefield Road Bridge at the moment.

PH1-16 Con't

So if we replace Pope-Chaucer and it takes anything that comes under Middlefield, what is the least amount of work and least amount of area impact that we can then do to accommodate that flow?

And so we spent a lot of time with hydrologists, spent a lot of time over and over, over the last couple of years, looking at the channel, different cross-sections, hundreds and hundreds of cross-sections of the channel between Pope-Chaucer and West Bayshore to find out exactly where the capacity falls short.

And trust us, we've minimized this project to just focusing on those areas. We're not looking for additional project areas to work, additional impacts, additional costs, additional aspects to our permits. We're really just zeroing in. And there's no, you know, big stretches of this that no work is being done.

So I really wanted to emphasize for people that are concerned about the impacts of this project, there are impacts and you should be concerned and we want to know your comments. We're trying to minimize those impacts because we have an interest in having a project that we can permit, finance and get land for. And every time you increase a project, you make it more difficult on all three scores: You need more land, permits get more complicated and you need more money.

AUDIENCE MEMBER: Speaking of impact we live on the corner of Pope and Woodland. And I'm wondering what will our life be like for ten months?

PH1-16
Con't

MR. MATERMAN: It will be -- you will have something to look forward to after the project is done.

You know --

AUDIENCE MEMBER: I'm wondering if we can get in and out. Will we be vibrating all that time?

MR. MATERMAN: Well, no. So, you know, it's -- I will not try to sugarcoat this and say there will be noise, there will be truck traffic. You will know that a bridge is being constructed across the street.

We will work with you and other neighbors that are close by, including the gentleman right behind you, to try to reduce the impact as much as possible of this work.

And as I said, you know, our engineering firm, NV5, the gentleman that spoke earlier, they're working with the Santa Clara Valley Water District and with us to try to find a way to make the construction method used to build that bridge as -- with as little impact with noise and vibration, and dust and those kind of things as possible.

So, it's going to be challenging. But, we'll get through it together.

PH1-16 Con't

And I'm sure that doesn't help right now. Because we still have something to look forward to, but we want to work with you. And we definitely want to get your contact information, both of you, because you both have kind of a special place on this project.

All right.

Yes, ma'am? And then I will get to you, sir.

AUDIENCE MEMBER: Will you be doing the downstream project first and then the bridge?

MR. MATERMAN: Well, as I mentioned earlier --

AUDIENCE MEMBER: Makes better sense to finish those first.

MR. MATERMAN: The question was kind of the sequencing of the different project elements. And I touched on it earlier.

So, the bridge can go simultaneous to any of these, but can't go before we do these things because if you did it before and there was a very strong winter of storms, then we put at risk the people downstream.

So we are working right now -- there's also this Newell Bridge project out there on the same time scale as our work. And so we're working now to figure out for our project elements, those five, and the Newell Bridge project, you know, what's the best sequencing approach in terms of traffic, in terms of hydrology, in terms of, you know, there's a lot of people here who live in East Palo Alto that need to get out of here every day, either through University or Newell or West Bayshore Road and we can't close two of those three access points at the same time.

PH1-16 Con't

So it's a pretty complicated deal over the next three years, 2020, 2021, 2022, to sequence all this. And all we know, this has to go last. So part of it depends on the Newell Bridge schedule.

Is this a follow-up?

PH1-17

AUDIENCE MEMBER: This is actually just a quick question. How wide is the bridge going to be? How many --

MR. MATERMAN: The Pope-Chaucer Bridge?

AUDIENCE MEMBER: Yeah.

MR. MATERMAN: In terms of roadway, exactly the

PH1-17
Con't

same. No change.

In fact, it will be less wide if you think about it because the current bridge on the sides has all the concrete we talked about. But also even on the upstream face it extends out. So it's really just -- and the rendering, the aerial rendering over there, which is in the document -- this gentleman mentioned put it in the presentation, which I will -- that aerial rendering, I think, gives a little better picture of how the roadway is seamless between Pope, Chaucer and the bridge in between.

PH1-18

AUDIENCE MEMBER: You mentioned regrading is a necessary part of Pope. Will you need to close the road at all for a day or two to do that?

MR. MATERMAN: You know, I will defer to the engineers.

MR. NYGAARD: That would be me. The answer would be yes, to some extent.

We're not -- again, we've been working to bring the deck level down so it will now be only a matter of less than a foot above the current roadway elevation. And we are now grading that out to see how far that extends with this new deck elevation down to a very good, appropriate, final project.

That grading obviously, though, will impact

PH1-18 Con't

traffic and locations on -- not a great deal of time to do that sort of work, but there is impact to that as we grade around corners to mesh back into the existing road.

AUDIENCE MEMBER: Does does that mean the road intersection may be closed over a couple days?

MR. NYGAARD: Normally we try to close it during the construction day, but make it so they can still be driven on after the work is done in the evening. You can do plating. You can do temporary AC ramps. Those sort of things. That can be done.

That would be part of what we work on with the district in terms of looking at what type of windows we want to provide to the contractor and that is a balancing act between impact to the neighborhood and cost because of length time it takes for the contractor to do it.

MR. MATERMAN: Yes, sir?

PH1-19

AUDIENCE MEMBER: What is the flow capacity of the El Camino bridge?

MR. MATERMAN: I think it's about 8,800 cubic feet per second. Much greater than Middlefield or the Pope-Chaucer Bridge.

Yes, sir?

PH1-20

AUDIENCE MEMBER: I just had a comment.

I've lived in the area for over 50 years. And I love this Creek and I want it to stay as natural as it possibly can be.

And I must say, at least from the renderings, I'm -- I feel that this project that you're talking about is an improvement over what we saw perhaps three or four years ago.

The only thing I was going to say, I know it is not your priority and so forth, but this is such a beautiful asset to this area, it is too bad that there's not an opportunity to have a pedestrian path or something here where people could enjoy this year round. It really is like a refuge. It is like being in the Sierras or something.

PH1-20
Con't

And again, I know it is not the top priority, but as you look at these things, and as you design them, the idea that this could be recreational space I think is important, particularly as we add density and so forth to our communities.

MR. MATERMAN: Yeah. I appreciate that comment.

We, as part of the environmental document, we have included two creek-side parks. They're both in East Palo Alto. One is here by Manhattan and one is between Newell and University, right there.

And you know, we've talked with the city off and on for years about a San Francisquito Creek trail on this side of the highway. There is one that we built on the other side of the highway because there's more space.

And it's really just an issue Woodland Avenue is so constrained already between the top of the Creek bank, then the roadway, and then the properties on the other side. Other than the sidewalks that exist such as they do, you know, how do you eke out a trail out of that?

PH1-20 Con't

But, if you have specific ideas of that, you know, feel free to come to us and certainly come to the city's transportation division and we can talk about what that might look like and how feasible it is.

Yes, sir?

AUDIENCE MEMBER: How do we you define exactly what trees you're taking out along Woodland Avenue? Like specific trees?

I thought -- I know what the rendering of the bridge looks like, but, like, I would like to know exactly which trees are being removed. But there's a huge eucalyptus tree along Woodland Avenue that's toward where that ramp that you focus out further.

PH1-21

MR. MATERMAN: Upstream of Pope?

AUDIENCE MEMBER: Upstream of Pope. I do not want that eucalyptus tree to be removed. So I would like to know exactly which trees -- I know the oak trees are going to be removed where the bridge is, but just in general. But I think you should be very specific about which trees you are taking out, like along the side, the bank, if you have to. How far back along the bridge do you have to widen the bank? Because of that you have to remove some trees. I would like to know exactly which trees you will be removing.

MR. MATERMAN: So what -- I think -- we can't answer that at this moment.

I think it's interplay between the bridge designer and us and we can have a separate conversation with you and probably go on the site and talk about that.

PH1-21 Con't

The document does list the trees.

AUDIENCE MEMBER: The EIR does not list the trees.

MR. MATERMAN: It lists the trees that are slated for removal. It is not an aerial of -- because it is hard to get an aerial of all these trees because their leaves are, whatever, intermingling and all this.

But before you go, we'll show you in the document where that table is that lists all the trees. Okay?

But as I said, we'll be glad to come out and have a separate conversation.

Yes, ma'am?

PH1-21 Con't

AUDIENCE MEMBER: Yes, I would just like to add a comment about eucalyptus trees, something that I think we need to consider are the honey bees like them.

MR. MATERMAN: We do. Thank you.

Is there anybody else that wants to comment?

Okay, go ahead.

PH1-22

AUDIENCE MEMBER: I also have a lot of questions.

So, the bridge is basically a bridge for automobiles to go across it. But there's always ideas to eliminate that bridge? I don't think the popularity is strong for that. But I was curious if you evaluated that in some form. I was not personally -- that was not something that I wanted originally, but over time because of all the traffic issues that we have, that's something that I feel is not a bad idea now. But so I'm curious if that's something that you evaluated.

MR. MATERMAN: Well, so what we did was -- yes. The answer is yes.

And what that evaluation looks like is we went to both cities and we brought that up, because that was -- we went through it quickly, but that was one of the 17 alternatives was to eliminate the Pope-Chaucer Bridge or replace it with only a pedestrian and bicycle bridge. So we did talk with both cities about that and

PH1-22 Con't

after some kind of extended conversation, neither city would be supportive of that. It would probably remove traffic, but there may be other reasons, but I don't remember.

And --

AUDIENCE MEMBER: "Neither city" being Palo Alto and Menlo Park?

MR. MATERMAN: And Menlo Park.

MR. MURRAY: I would also add there was concern about emergency first responder access, because that's one of the routes.

MR. MATERMAN: Yes?

PH1-23

AUDIENCE MEMBER: If you're not able to show how many -- which trees are going to be removed because there's too many, it's kind of hard and they all get muddled with each other, maybe you should show a map of trees that will remain and that way -- maybe it is easier to depict that instead of how many are going to be removed.

MR. MATERMAN: If we can for the next hearing, I think that's a good idea is to figure out a way -- clearly that's an interest, is to show the trees that we're impacting.

Yeah? Did you have --

No. Okay.

All right. Any other -- yes, sir?

PH1-24

AUDIENCE MEMBER: Question about construction. It -- construction is only limited to daytime?

MR. MATERMAN: Construction hours. Yes, limited to daytime per ordinances and I believe 8:00 to 5:00. Is the -- does anybody -- Aaron, do you know? We're following city ordinances in terms of construction hours.

Okay. I think we're kind of wrapping up. Are there any other last comments?

Again, we have public comment cards. We encourage you to come to a future meeting or submit a card or send us an e-mail if that's your inclination.

Thank you very much for coming.

(Proceedings concluded.)

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REPORTER'S CERTIFICATE

I, Connie J. Parchman, CSR #6137, do hereby certify that I am an official court reporter; that I was the certified shorthand reporter in the above-mentioned case; that I took down in shorthand the proceedings and thereafter transcribed said notes into longhand; and that the forgoing pages upon which my name appears at the bottom, constitute a full, true and correct transcript of the said notes in said proceedings.

Connie Parchman

Connie J. Parchman, CSR #6137

Dated: JUNE 3, 2019

DUBLIN, CA

SAN FRANCISQUITO CREEK JOINT POWERS AUTHORITY
DRAFT ENVIRONMENTAL IMPACT REPORT
PUBLIC HEARING

Reporter's Transcript of Proceedings

Wednesday, May 29, 2019
East Palo Alto City Hall Community Room
2415 University Avenue
East Palo Alto, CA

Reported by:
Connie J. Parchman, CSR 6137
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MAY 29, 2019, WEDNESDAY 7:12 P.M.

---OOO---

MR. MATERMAN: Welcome, everybody, to our second public hearing for the Draft Environmental Impact Report.

Can everybody hear me okay?

I want to welcome you. And my name is Len Materman. I'm the Executive Director of the San Fransciquito Creek Joint Powers Authority.

Kevin Murray is a senior project manager at the Joint Powers Authority.

Tess Byler is a project manager.

Miyko Harris-Parker, that's our finance administration.

And on our board, we're really happy to have two of our board members tonight. Gary Kremen is chair of our board. And Ruben Abrica, East Palo Alto. He's on our board and he's been on our board for a while. So thank you both for coming today.

So we'll start with a presentation and then we'll take your comments, public comments, on the project and on the environmental document.

Okay. So, I'll try to go through this relatively quickly. If you have a question, please raise your hand and ask while I'm going through it.

This image shows San Francisquito Creek going out to the Bay.

And it shows the various floodplains. In the blue is the Creek floodplain; in green is the Bay floodplain; and red, if you have a property in the red areas, you're in the both the Creek and Bay floodplain.

Last year we completed a project from the Bay to Highway 101. And the objective of that project was to remove people from the Creek floodplain so they would just be in the Bay floodplain.

Now the project we're talking about today is on the other side Highway 101, upstream. And the objective of that project is to get rid of the blue and red areas so all that's left is the Bay floodplain.

And finally we have a project that's also in planning and design to deal with shoreline or Bay flooding and the objective of that project is to remove all three floodplains.

So the project we completed last year is really the cornerstone of our work upstream and continuing along the shoreline.

And to spend just one minute on the shoreline piece, this is an image that shows the Friendship Bridge up there. And the Creek has been widened into the Palo Alto Golf Course. East Palo Alto is on the left side of the image and this purple line represents the East Palo Alto levee, which is also here. This levee here. Here's East Palo Alto, here's the Creek going out to the Bay. This blue area is the FEMA flood line.

The objective of the project is to get the City of East Palo Alto, about 1,600 properties, out of that floodplain by building along the yellow line, that levee.

So what that shows is really two levees, one here and one here. And we'll have a separate process of design and environmental review on that large project affecting East Palo Alto and Menlo Park actually north of Highway 84.

We're going to show a video, which is about two and a half minutes, of the project that we completed and then the project areas that we're working on for this project. And it's probably the best way to acquaint people with the project that we're proposing here and how it fits in with what we just completed here.

What we're showing here is this is the Friendship Bridge and the extension of the boardwalk and East Palo Alto is on the right, Palo Alto Golf Course on the left. And essentially we took the same channel where you see most of the water and we just widened the whole channel and created a marsh on the two sides of where the Creek is.

This project was completed in December of 2018. There were three years of construction. Locally it was largely funded by the Santa Clara Valley Water District which had a countywide ballot measure passed several years ago, as well as the cities and San Mateo County put in some funds as well. And we raised money from the State of California and P.G.&E. was a major player in the project in terms of money and work.

Then on the other side of the highway, upstream of Highway 101, we will be widening the Creek where you see that sack concrete on the Palo Alto side on the right to conform with the new widened bridge under Highway 101 and West Bayshore Road.

And then upstream of there, between Newell and University, we'll be doing widening on the Palo Alto side where the sack concrete is. This whole stretch on the right side of the image now.

And what you see in the far part of the picture is the Newell Bridge. We're looking downstream toward Newell and then a little bit farther upstream, behind a few Palo Alto homes we have more widening to do in areas that have sack concrete on the Palo Alto side.

It's right here. The Palo Alto homes are off to the right. And these areas don't have enough capacity because of the concrete that's been in the channel.

Upstream of University Avenue right here you might recognize -- here's the University Avenue Bridge -- this wooden flood wall or wooden parapet extension that was put in after the flooding of 2012. We will be replacing that with a more permanent structure. We will be removing concrete like this large structure in the channel on the left and East Palo Alto across from where the Four Seasons complex is.

And then downstream of there, doing widening on the sack concrete, again on the Palo Alto side right there.

And there's the University Avenue Bridge.

And finally, at -- upstream of there at Pope-Chaucer Bridge, replacing Pope-Chaucer Bridge.

And there we go. See what that looks like.

This is looking upstream from the downstream. So Menlo Park is on the right, Palo Alto on the left. And essentially under Pope-Chaucer Bridge is a big culvert, but not big enough to pass the water that gets to that location. So we will be removing the bridge and the culvert underneath it and putting in a different bridge, which we'll show.

Okay. So, that's the summary of what we've done and what we're proposing to do.

The purpose of this meeting is to describe the project and receive your comments. There are these comment cards which you can either fill out today or send in later. You can also send us an e-mail.

This is the second of three public hearings. This is today and then we have next Wednesday in Palo Alto. Last week we had one in Menlo Park.

In terms of process, we did the Notice of Preparation in December of 2017.

We had what's called scoping meetings a couple months later to get public input into what we were going to look at, the scope of the EIR.

In October of 2017 we had a series of workshops and a public tour of project sites to get additional input.

The draft EIR came out on April 22nd. And now we're doing our public meetings in May and June.

We also have presentations at city councils and JPA Board, which is a public process. And then we plan to release the final EIR in a few months.

And then we get into permitting this fall. And then in spring, in addition to permitting, we also need to secure land easements and finish the financing of the project, piecing that together.

And we planned two years of phased construction, beginning either in 2020 or 2021, depending on when we can complete these elements.

Lots of outreach. We mailed out 13,000 postcards, thanks to Albert and his colleagues at the Water District and -- to properties in all three cities. And then various social media and city councils. And we also had advertisements in newspapers.

However you found out about it we're glad you're here.

Looking at the capacities upstream, this is San Francisquito Creek flowing this way. Highway 101 cuts through the image. Pope-Chaucer Bridge has the least amount of capacity. The strategy, then, is to replace that bridge and only fix the areas downstream that may overtop as a result of increased flow going under the new bridge.

The objectives of the project are protect life, property and infrastructure; enhance the environment; connect to recreational opportunities or create new ones; minimize maintenance in the future; and importantly, not preclude future actions to bring up the flood protection level.

There are three fundamental ways to address this issue: Contain water in up -- upstream -- I'm sorry, contain water in the channel in the floodplain area between Pope-Chaucer Bridge and Highway 101;

Detain water upstream;

Or bypass water around the floodplain area.

Within the context of those options, we had 17 alternatives in the Environmental Impact Report, the draft. At first we proposed the top five. "No project" is a part of all EIRs. So we proposed the next four after that. And then through the public process, we got additional -- we went from essentially 5 to 17.

We screened these -- this is in the EIR in Table 2-1; we can answer questions about that -- based on the project's ability to meet objectives, various alternatives.

And then four of them we felt could meet the project's objectives and we went to the next level of screening which was feasibility, cost, logistical feasibility and technical feasibility. And three of the four advanced for full analysis in the EIR.

So, those are:

Replacing the Pope-Chaucer Bridge and that railing along Woodland at University and widening the channel downstream.

Number five, replacement -- doing the same thing, but building flood walls.

And in between, the alternative to construct one or more detention basins.

So we'll walk through those relatively quickly.

The objective of the project downstream, we increased the Creek capacity 4,500 cubic feet per second, which is about double what it was. And so now the capacity is 9,400. That is sea level ten feet above today's high tide.

And upstream in the area of purple between Highway 101 and Pope-Chaucer to increase the capacity by 1,700 to 7,500, which is the most at that location.

And then in terms of upstream detention, increase another 1,000 CFS.

The idea is to get 7,500 plus 1,000, to exceed the 100-year flow, which is 8,150 at the Pope-Chaucer Bridge.

This is what upstream detention looks like in terms of locations. Searsville Dam and Reservoir is here. Highway 280 you see on the right side of the picture. So you see a project that Stanford is considering right now to modify the dam to allow fish passage through that area, but also to -- one of the benefits of that proposed project is that it would capture water behind the dam and provide a detention basin to reduce flooding downstream.

We also looked at two other sites, a former plant nursery called Boething and Webb Ranch which is closer to Highway 280.

The flood wall alternative, again three alternatives that are studied in depth in the EIR, was to replace the Pope-Chaucer Bridge and do widening where these orange lines are. This is where that wooden parapet extension is upstream of University Avenue, it would match the Palo Alto side.

And then also do widening at West Bayshore Road, which I mentioned during the video.

There's a separate project at the City of Palo Alto to replace the Newell Road Bridge, which is important. We can't replace the Pope-Chaucer Bridge until that Newell Road Bridge is replaced.

So that's the flood wall alternative.

Can you go back to that for one second and then go forward?

I just want to show the difference. This is the footprint with the flood walls and footprint of the preferred project, which we call the channel widening alternative. This is the green area. It's the same thing as the last alternative except no flood walls, but it's widening those three green areas.

This is the West Bayshore Road. This is what it looks like. East Palo Alto is on the left side of this image and Highway 101 and then looking toward downstream.

And this was it under construction, which would have been about a year and a half ago, I guess.

And so when it was -- when it was rebuilt, we went from three culverts to four. There's a fourth one right there, but it was closed off and so now we want to open it as part of this Upstream Project.

And then what widening looks like on the Palo Alto side between Newell and even upstream of University is, as I mentioned before, there's sack concrete behind Palo Alto homes behind the Creek and this is what it looks like.

When Kevin advances the image, you will see that the Creek is essentially getting wider since we don't have a lot of space at the top of the creek bank because of the homes behind there. We have to build a soil nail wall and we can't just have a slope natural creek bank on this location.

So that's what that looks like.

This is at University Avenue. This is the University Avenue Bridge, Woodland is on the right side of the picture and there's that wooden extension of the bridge parapet. And it was put in by the City of East Palo Alto after the December 2012 flood. And so it was in early 2013. And we will replace it with a permanent structure of the same height.

As mentioned, large concrete areas upstream of there too. This is the East Palo Alto side. Woodland Avenue is beyond this wall here, which is also concrete. And we basically take this out. This is one area where we do have geography on the creek bank to create a natural slope toward Woodland Avenue.

We have proposed two creekside parks in East Palo Alto. One is just above that last image that I showed. And that is right across the street from Manhattan Avenue. There's University Avenue so you can see.

And then the other one is between Newell and University just upstream of where Cooley Avenue runs into Woodland.

And this is an image of what it looks like at the site near Cooley. Woodland Avenue is right here. And this is -- and this is what it looks like across from Manhattan, that stop sign and there's also a bus stop there.

This is what we -- this is a rendering of what we propose the new Pope-Chaucer Bridge to look like. And as you can see, we're getting rid -- we're proposing to get rid of a lot of concrete under the roadway and create a more natural channel bottom. So that's -- and this image shows it a couple years after the vegetation has grown in.

Okay. So the EIR looked at all of these three alternatives in terms of all these different issues from aesthetics to utilities, which is typical of environmental impact reports. And then to describe either -- the alternative would have no impact on these resources, whether biology or aesthetics, traffic, or to have less than significant impact or significant impact that can be mitigated or a significant impact that cannot be mitigated.

So the finding of the EIR was that there were two significant and unavoidable impacts from the project. One that was during construction, noise. And one was a cumulative impact of the project on resources such as the highway and that's really air quality.

So those are the two significant and unavoidable impacts.

The EIR found there were a lot of impacts that could be mitigated to a level of less than significant and in a lot of various sections of the EIR, there are examples of that.

There were only three of the areas that are permanent: Biology, hydrology, and geology.

Trucks and traffic, we think of as being one of the important impacts that we think -- we highlighted in presentations like this because we think that's what the community is interested in. Certainly you may hear about other impacts that you're interested in.

But this one we looked at. I think it's nine intersections. And this is specific to the issue of replacing the Pope-Chaucer Bridge. The proposal when we replace the bridge is that we don't try to maintain traffic while we're working on it. We just tear it out and there's no vehicular traffic for up to a nine-month period.

So we looked at the various intersections that would be affected by that. Two of them were found to have a significant impact. They're on both sides of the Creek at Middlefield Road. And the mitigation for that is to put in a temporary traffic light.

We're talking with the City of Menlo Park about whether -- because they have some interest in that intersection too. They recognize it's a problem already and they may want to put in a more permanent traffic light so we're working with them on that.

The other intersections that we looked at we didn't find as significant impacts.

Also during construction we looked at a number of -- the amount of traffic related to the construction in terms of truck traffic and workers. And here are some of the highlights of it in terms of maximum increase in traffic of 60 trips per day. Most of the workers would be at the Pope-Chaucer site.

Channel widening would require a lot of truck hauling trips. So if you're in East Palo Alto on the west side you will definitely notice when the construction is in the channel there.

The actual work will take place in the channel. It wouldn't be from Woodland Avenue, but there will be a lot of trucks coming in and out of the Creek from Woodland Avenue in that area.

And in terms of -- this the image doesn't show it, but in terms of staging, there are two staging areas we looked at. They're both in East Palo Alto. One is here and one is up there. And those are described in the EIR. And that's where there would be kind of trailers and things like that during the duration of the construction.

And in terms of noise, if you're on the west side of East Palo Alto you also would notice the construction going on in terms of noise. Construction equipment obviously could be noisy for limited periods of time. And truck traffic would also be a noise issue. And the EIR dives into that quite a bit.

We also today have our consultant on the environmental document, our project manager Aaron Carter with us. He can answer questions about it as well as staff from Santa Clara Valley Water District who are working on the Pope-Chaucer Bridge design and channel widening design.

So in summary, in terms of what we're trying to achieve, we've completed a project that has all the flood protection that's needed for East Palo Alto from West Bayshore Road to the Bay, which is great in terms of creek flow and tides coming into the Creek.

And then upstream we're looking at equivalent to the 1998 event for protections from Pope-Chaucer down to the Bay.

Then after that, some level of protection afforded by upstream detention as well.

Okay. That's the presentation.

So, we would love questions and comments. And if you make comments, we have a court reporter here and she'll sometimes, if she can't hear, ask you to speak up because she's trying to get everything down. And those comments will become part of the public record and the EIR and we will respond to them in the final EIR which we will develop over the summer.

If you have questions we would answer questions about the document or the project.

Yes, sir?

PH2-1

MR. SHORE: Jeff Shore, Palo Alto resident.

I had a question about the factors that led you to a project that falls short during this project of the 100-year flood protection for the communities that are adjacent to the Creek.

MR. MATERMAN: So the objective of the project, cumulatively, in a programmatic way is to provide that level of protection.

Do you want to go back to the "objective" slide?

And then -- but I know what you're asking about, obviously.

Okay. So, the objective of the project is to exceed the 100-year event in terms of protection.

What we needed to figure out was: Okay, how do we do that in a way that's achievable so we don't try to propose a project that achieves this right off the bat, but doesn't get off the ground because there isn't community support or it's more expensive or technically infeasible?

And so we tried to design this project in phases and both of those phases can be pursued at the same time. It doesn't mean that one has to be pursued

PH2-1
Con't

and we have to wait.

But, this is an achievable project. We're confident of that based on logistics and technical feasibility and cost.

And then this project we intend to pursue, as I said we're working with Stanford on it and we also intend to pursue it as a separate project if the project at Searsville doesn't move forward. But in concert, they can achieve the objective.

One of the things I want to say about just doing upstream detention. There are really two reasons we didn't pursue that right off the bat as a sole project.

One is that we have those technical and logistical constraints that Stanford is a landowner that we're working with. And -- but we didn't have the immediate access to the site. That was one issue.

Second issue is if you think about it, especially with climate change, these -- we anticipate that -- and we've seen this already to some degree -- that storms will be more intense and perhaps of longer duration than what we've seen in the past. And if we rely on a basin to capture water as the sole vehicle of providing flood protection, it loses the ability, if there's a storm of great duration, to continue to serve as a flood protection basin.

And if you build capacity downstream, regardless of the storm's duration, it will be an effective part of the solution.

PH2-1 Con't

So, we haven't in any way abandoned the 100-year event protection level. We've developed a document that allows us to apply for permits on this and discusses this to a level that, whether it's through Searsville or Webb Ranch, we can then pursue that next phase of the project relatively soon to try to achieve both things.

MR. SHORE: Just a follow-up question?

MR. MATERMAN: Sure.

PH2-2

MR. SHORE: Why is this project scope defined by reference to the detention when the detention is well outside the control of the parties who are participating in the Joint Powers Authority inasmuch as it requires a landowner to give up some rights with respect to its land?

MR. MATERMAN: Well, I mean, that's why it's not our primary -- that's not -- that's why we're not pursuing it in as -- our time scale to accomplish it is not believed to be as short as if we do the project that we have the rights -- land rights on.

I guess I'm not understanding the question.

You're saying -- try it again?

MR. SHORE: Sorry. It seems to me that -- my concept of a project scope, or a project for -- that would be the -- that would be the -- that would be actionable, would be those things that you've described, other than the detention, because the detention is a possibility but it's not something that can be actioned within the -- the complete control of the parties that are pursuing it. That's all.

PH2-2 Con't

MR. MATERMAN: We're looking for a project -- I like to say a project that's meaningful and achievable. 7,500 CFS is meaningful. It is the biggest flow that we've seen in the 89 years that we've been recording flow, since 1930.

It is -- it's achievable in the sense that it's a manageable project with relatively limited impacts.

And in terms of financial and technical feasibility, we believe we can do this in the relatively near term. As I said, construction in 2020 or 2021 with two years of construction.

We do not believe it's prudent to give up on the idea of going beyond that. And that looks like detention basins. And Stanford has a court mandate that it pursue something at Searsville which allows fish passage. It has said its preferred project there is putting a hole at the base of the dam that also provides flood protection along the lines of 1,000 cubic feet per second.

We've said in the document otherwise that if they choose not to pursue the project at Searsville we will pursue a project at Webb Ranch. And we intend to do that. So that's the thought process.

PH2-2 Con't

MR. MURRAY: And just to add to that, we did look at alternatives that potentially could achieve a 100-year protection with one action. But those were largely not feasible either because of the level of impacts it would cause or the costs or because of the amount of, you know -- if we built big flood walls to carry additional water downstream, the additional velocity and sheer stress that causes could just tear up the creek bank and vegetation.

So we looked for a project that we could actually build within the channel that made the improvements to bring the natural -- the flow back up to what the natural channel could carry if people had never built these bridges or put these structures in the channel in the first place.

And the preferred project is where we landed. We think the easiest way or best way -- I won't say easiest -- the best way to augment that protection is build upstream detention.

We could in the future do something that's not upstream detention that's supplemental to the project we're proposing, but at this point in time, upstream detention looks like the most promising.

PH2-2 Con't

MR. SHORE: Thank you.

MR. MATERMAN: If you want to turn that question into a comment, you know, we can figure that out or you can write down a comment.

MR. SHORE: I will collect my thoughts.

MR. MATERMAN: That sounds good.

Yes?

AUDIENCE MEMBER: During the timeline that you made that -- in order to make the maximum improvements you're planning, is there a timeline to that schedule?

MR. MATERMAN: So what is the timeline for the construction?

AUDIENCE MEMBER: Actual maximum improvement of the whole system, over the whole --

PH2-3

MR. MATERMAN: Including the detention upstream?

AUDIENCE MEMBER: Yes.

MR. MATERMAN: You know, I think we, as I said we hope to start construction in 2020. That's subject to permits, land and money. All three of those things are complex.

If we don't start in 2020, then we're all pretty confident we'll start in 2021. So two years from now.

Two years of construction, that's 2021 and 2022, so by November 2022, we're done with the piece that's in pink; right?

In terms of upstream detention, we've already had conversations at the JPA and its board about pursuing that, not waiting for our project downstream to be completed before we start kind of pursuing that.

PH2-3 Con't

And the pursuit of that is -- takes several forms. We've been meeting with Stanford for years about the Searsville project and what that would mean for the areas downstream, in terms of hydrology and sediment, largely.

And so that continued technical conversation is part of pursuing that to enable Stanford to do a good project at Searsville that helps us downstream achieve a capacity greater than that. Pursuing that could also mean pursuing, you know, as Mr. Shore mentioned, pursuing land rights so that we can build what we want to build. And we've already stated that that's our plan B if Searsville doesn't happen.

So in terms of when that would be constructed,

PH2-3 Con't

it's hard to say. But, I think Stanford at least professes they're moving quickly on a proposal for Searsville. I don't know when that would take shape. So, if we construct in 2021 and 2022, you know, it's -- on the most aggressive time scale, I would say by 2024, five years from now, we could have something more comprehensive.

AUDIENCE MEMBER: That assumes Stanford is somewhere between 60, 70 percent certain they may come up with some plan that would -- can satisfy the needs that we have.

MR. MATERMAN: Yeah, I mean that's a good question and hard to answer.

I think the way that I'm thinking about it right now is if Stanford has not submitted a project for permits by the time we're ready to take down Pope-Chaucer, then that's the marker. Two years from now, we would take down -- we would hopefully take down Pope-Chaucer Bridge, maybe three in these various schedules. And if there's not a specific project being proposed by Stanford for regulators by that point, then we would take actions to pursue other options. That's enough time, based on kind of where Stanford is at in the -- in their deliberations and I think we'll probably have a pretty good idea of where things stand prior to

2022.

Go ahead.

MR. MURRAY: I would add that Stanford's been thinking about what to do with Searsville 20 years, maybe more, because they've known it's an issue. So they've been having discussions with the community, they've been doing studies, they've been talking a lot and talking to regulatory agencies.

PH2-3 Con't

I think what's transpired in the last couple years has given all of us who have been involved a lot more confidence that something might actually, really happen soon. So we're very hopeful that they are successful in moving forward with the project that they're proposing, because it would be quite beneficial to provide protection downstream and looks like the most promising option right now for us to augment on.

AUDIENCE MEMBER: Over the next ten years we'd probably have something.

MR. MATERMAN: Other comments or questions?

Yes, Jeff?

PH2-4

MR. SHORE: Question. And I apologize if this is all laid out in the EIR, I haven't read it.

With respect to the channel widening areas, what kinds of -- and over what periods would you expect temporary construction easements to be sought and to what extent would you expect permanent easements to be sought?

MR. MATERMAN: Okay. So, I will tackle permanent and I'm going to ask either Alec or Kevin to tackle temporary construction.

Do you want to go back to the slide on the soil nail?

MR. MURRAY: That's forward; right?

MR. MATERMAN: Yeah.

PH2-4 Con't

So, the only easements that we need for the channel widening is where we're putting in the soil nail wall, which is between Newell and University and then upstream of University. It is an underground easement, because these Palo Alto properties own pretty much to the centerline of the Creek and we have -- the Santa Clara Valley Water District has the easement to do work almost -- you can say to their back fences now.

But they don't have easements for these soil nails to go 20 to 25 feet underground. And so we would need underground easements to extend these soil nails into their property.

It wouldn't be noticeable to them above ground, or -- and we've gone into their backyards and looked at swimming pools and other things that people might actually be concerned about with this kind of approach.

And so there's really -- we don't think there's

PH2-4
Con't

any issue there. We're pretty confident. But we would need a land easement for that.

The creekside park by Manhattan in East Palo Alto is on private property. And we've been talking with the property owner about what that looks like and we just have to figure out if we do it or they do it and that might involve land easements. We have an easement to do flood protection, but we don't have an easement to do recreation.

In terms of the West Bayshore Road -- just upstream of West Bayshore, my belief -- and I'm going to look to Alec to answer this -- is that no additional land easements are required.

MR. NICHOLAS: Correct.

MR. MATERMAN: Alec or Kevin, somebody, do you want to say something about temporary construction easements?

MR. NICHOLAS: It would be pretty much construction from the creek side. There wouldn't be really much easements required on the property side with labor contractors going up above. Very minimal, at most.

MR. MURRAY: The planned entry points are areas that currently have easements from the Woodland Avenue side; right?

MR. NICHOLAS: Yeah, it would not be from your

PH2-4 Con't

backyard.

MR. SHORE: Just to make sure I understand, in simplistic terms, the construction equipment would be in the creek bed?

MR. MURRAY: That's right.

MR. SHORE: There wouldn't be any top of bank construction equipment.

MS. BYERLY: Top down construction.

PH2-5

MR. NICHOLAS: Yes. They wouldn't excavate that full slope at once. They would excavate four-foot segments from the top, make that nice cut that you see over there, drill a soil nail and then concrete it a little bit, excavate the next four feet, drill it, concrete it, until you get all the way to the bottom of the channel. And then you come in and construct the final part of the wall.

MR. SHORE: With respect to West Bayshore where there's already an engineered wall, what happens to that wall vis-a-vis creek widening?

PH2-6

MR. NICHOLAS: So that wall at the transition is not going to be a soil nail wall. It is currently being designed so we do not need any easements underneath the properties. It is going to be more of a sheet pile wall similar to downstream.

PH2-6
Con't

MR. SHORE: Okay. So the current wall is going
to be removed then?

MR. NICHOLAS: It's not really much of a wall,
it is more just sack concrete with a little bit of a
masonry wall above the bank. So those would be removed
and replaced with the sheet pile wall.

MR. SHORE: Okay.

MR. MATERMAN: Other questions or comments?
Nothing?

MS. BYERLY: If you change your mind, take a
comment card and make a comment later.

MR. MATERMAN: So yeah, couple things. Comment
cards over here. You can write it down, hand it to one
of us or mail it in or send us an e-mail.

We have these posters in the back, which you
probably saw. Several of us will be around for a little
while if you have questions about the project and you
want to ask slightly more privately than in this room.

And thanks for coming.

Last chance, any comments or questions?

No? Okay.

(Proceedings concluded.)

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REPORTER'S CERTIFICATE

I, Connie J. Parchman, CSR #6137, do hereby certify that I am an official court reporter; that I was the certified shorthand reporter in the above-mentioned case; that I took down in shorthand the proceedings and thereafter transcribed said notes into longhand; and that the forgoing pages upon which my name appears at the bottom, constitute a full, true and correct transcript of the said notes in said proceedings.

Connie Parchman

Connie J. Parchman, CSR #6137

Dated: June 13, 2019

DUBLIN, CA

Public Hearing 3

SAN FRANCISQUITO CREEK JOINT POWERS AUTHORITY
DRAFT ENVIRONMENTAL IMPACT REPORT
PUBLIC HEARING

Reporter's Transcript of Proceedings

Wednesday, June 5, 2019
Palo Alto Art Center
1313 Newell Road
Palo Alto, CA

Reported by:
Connie J. Parchman, CSR 6137
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JUNE 5, 2019, WEDNESDAY 7:07 PM

P R O C E E D I N G S

---OOO---

MR. KREMEN: Welcome, everyone. Good evening. Thanks, everyone, for coming here. I want to welcome members of the public, members of the staff of the various agencies, some of the elected officials: Councilwoman Cormack, Councilwoman Kniss, Councilperson Abrica, et cetera.

My name is Gary Kremen. I have the privilege to serve as the Chair of the Board of the San Francisquito Creek Joint Powers Authority or as we call it, the JPA. I also represent most of you on the Santa Clara Valley Water District Board, now overwhelmingly known as Valley Water.

And one of our missions is flood control and keeping our communities safe. So I want to thank everyone here for coming and caring about this.

I especially want to thank people, the cities of East Palo Alto, Palo Alto, Menlo Park, and San Mateo County for continuing to work on this. The Army Corps of Engineers has been a long-term partner on this project.

And the people who contributed to writing -- I don't know if everyone's seen the document or looked at the draft document. I urge you to go home tonight and read it. It is a great 900-page read for those that have a little bit of time on their hands.

I used to live here in Palo Alto and I remember the flooding that we had in 1998, you know. 11,000 acres of land were flooded. 1,700 properties were damaged. 500 people were -- about -- evacuated in Palo Alto, Menlo Park and East Palo Alto.

And it was before my time, I guess in 1955 we also had some significant flooding. I don't know if anyone here remembers that.

But, just -- some of the people here from East Palo Alto, you know in December 2012 and February 2017, San Francisquito Creek went over its banks and there was damage caused. So the real good news is that the part of the project from 101 to the Bay is complete. And that's going to relieve a little stress we have upstream from here all the way up to Searsville Dam. But that's just a little stress in the system.

So right now we're here taking the first critical step to fix things from 101 upstream.

And that -- this is one of three community meetings. We had one in East Palo Alto. We had one in Menlo Park. And this is the final one in East Palo Alto.

So this big document, that might be worth reading. And if you can't read the whole 800 plus pages, the first chapter -- two chapters are pretty good. It was developed with a bunch of public input. We had four community meetings before. We had some stakeholder workshops and we did some tours.

As you can tell, anyone who lives around here knows how complex San Francisquito Creek is, how many bridges it goes under, how tight the roads are, how close it is to private property.

We're not building something in the middle of a field. We're building something to help everyone get flood protection in a complex urban area. So it's complicated. Kind of like this document.

So we're here tonight to hear what people think. We have a court reporter who's going to take down your questions, but you can also submit them on the website or you can call us up on the phone or text us or Snapchat us, whatever you want to do to get us the comments.

So, the engagement tonight is a pretty important part of what we're going to do to turn this Draft EIR into a Final EIR so then we can get going on the project and get some bulldozers on the ground.

So before we finish, I'm going to turn it over to Councilwoman Kniss who has some remarks and then Councilwoman Cormack if she has any remarks and

Counselperson Abrica if he has anything to say.

I want to thank the voters for putting up some of the money with the Water District and the Safe Clean Flood Measure that we had, Measure B. As you may or may not know, the Water District has come up with the majority of the money for this project, although some of it did come from Caltrans, you know, when they widened under 101 and P.G.&E. and San Mateo County, Palo Alto, East Palo Alto and Menlo Park. I'm talking downstream.

For the upstream, we're still in the fund-raising mode. We don't have the money. But the Water District hopes to contribute at least $7 million.

So we're extremely excited about this project and some of the other projects we're working on around Palo Alto, like the flood basin, tidal gates and the shoreline projects.

But thanks for coming out. I know everybody has other stuff to do tonight. And I'm going to turn this over to one of the most important people in Palo Alto, Councilwoman Kniss.

So come on up, most important person.

COUNCILWOMAN KNISS: Give Gary a hand. He did a good job on that. Nicely done.

So, the Creek behind me here, San Francisquito, is so many things to us. It divides us county to county, it divides us city to city. It also is an interestingly recreational area.

How many of you have ever seen canoes and rafts going down during floods? You've probably all seen that. So it's fun.

And if you go further up the Creek, up to Weekend Acres, you probably know people have docks out there and so forth. It really is sort of a recreational area as well as being the Creek.

So, my job tonight really is to say thank you to all of you. It was more than 20 years ago when I actually was sitting in the council chamber on the council then -- I did leave for a while, I promise.

But as we sat there, it got to be 11:30, 12:00 o'clock. We'd go late. And it was dripping from the ceiling. And I remember saying to whoever I was sitting next to: It must be raining really hard if it's coming through the roof.

And we all went home that night. Didn't think much about it, to be honest. And woke up -- this is before we had a website, before we had calls, before we had the wherewithal that we now have. And we had flooded. We had flooded so much that when I tried to drive to my job that morning, I couldn't get across 101.

So, that was a really hard time. And I know many of you in here -- in fact, why don't you put up your hand if you were here for the big flood in '88. '98. Sorry, 98.

That's a lot of you.

How many of you remember it?

And probably -- and were any of you -- Norm, I'm looking at you -- were any of you flooded?

I don't think you forget that. A friend of mine said, "My gosh, I opened the cellar door and the water came out."

That's pretty spooky. Or somebody will say -- friends have said, "I put my foot down at 3:00 A.M. and it got wet."

Not a good sign.

So as you know, we now have the Creek controlled at the -- either the nearest end or furthest end, however you look at it, the end closest to the Bay. That's now done. Dedicated -- oh, Len, when did we -- did we dedicate that in the spring?

MR. MATERMAN: December of last year.

COUNCILWOMAN KNISS: Time flies. December of last year.

And that was done, by the way, without any federal money. Even though we actively pleaded with them in Washington, nothing came to us. So that money was derived locally.

That's why tonight when Gary spoke, he said the money isn't there yet. But we're sure it's going to come. I think this time the -- actually the Federal Corps of Engineers may come through.

But as I said, my job is to say thank you. Thank you for being patient for 20 years. It is now coming to our community. It now will lend that same safety valve that we have in the East Palo Alto end.

And I so appreciate patience and appreciate Len who has really driven the first phase of this.

So with that, I'm going to see who else would like to come up.

Allison or Ruben?

So Allison Cormack.

Thank you.

COUNCILWOMAN CORMACK: Good evening. Thank you again, all of you, for being here.

One thing I just want to add is that the City of Palo Alto has an additional responsibility to ensure the success of this and that has to do with the Newell Street Bridge. Those of you following along, I just want you to know that we are aware of that. That project is going to be working along in parallel and an EIR has been released for that. So I just want to assure you that we are with working on that in tandem with the JPA.

Councilmember Abrica?

COUNCILMEMBER ABRICA: Thank you everyone for coming out and giving us your input and questions and suggestions.

I was on the school board when the flood took place in '98 and I remember that we woke up all the drivers, put all the buses to go and help.

And since that day I think that we collectively in this area have learned that emergency response for disasters, as well as working with our creek so we have flood management enhancing the whole beauty of it for recreation and then dealing with the protection of the environment have really, I think in many ways, sort of transformed -- at least for me, you know -- politically that some of those issues. We really have to work together seriously. And this is an example of that. Because there's been ups and downs over the years, but we've stayed together. So I really appreciate the work that everybody has done.

And I have on the website of East Palo Alto, because this initial segment, I just want to put a little geographic perspective, this first segment primarily is protecting the east side of East Palo Alto, primarily homes. And some areas on this side of Palo Alto.

But there were hundreds and hundreds of apartments that were flooded on the west side not too far from here. Many people were left without a place to be. And so, now this next period is going to cover everything from here up to the mountains.

So we definitely are looking forward to working with everybody, including Stanford. You know, Stanford is all over the place and this is another place where they are. Somehow we're going to have to work with them for that.

And just to remember that we are also working, the JPA is working, as well as other cities, on the other side because we're sort of moving up. But then we still move out to the SAFER Bay, because we can get flooded just by a tide. It doesn't even have to be the tide and the Creek with sea level rise.

Anyway, I'm proud to represent East Palo Alto and be part of the JPA. Thank you Len and all the people who have been working on this for many years.

Thank you.

MR. MATERMAN: Okay. Thank you to our board members for their comments and their attendance tonight and their attendance at our board meetings all the time and thank you all for coming today.

The agenda for today, or the purpose of the meeting today essentially is two things.

One is we'll have a presentation to explain the project and the process and solicit your verbal or written comments on the Draft EIR and the project itself.

There are comment cards available that you can fill out tonight and give to us or you can mail to us. You can also send it, as was mentioned previously by our chair, Gary Kremen, you can also e-mail it to us.

The deadline for the comment period is June 19th, so a couple weeks from today.

This is the third of three hearings. The first two were in Menlo Park, two weeks ago approximately, and last week in East Palo Alto.

Again, thank you for coming tonight.

So now I will run through the project.

This image shows the various floodplains of our area. I will walk through it.

In blue is the Creek floodplain, meaning waters coming out from the Creek. This shows the extent of the modeled 100-year flow. In green is the Bay floodplain. And properties that are in red are both floodplains, Bay and Creek floodplain.

The project we finished from the Bay to Highway 101 is shown now in the blue-green, and as was mentioned it was a very substantial protection in terms of the maximum creek flow that could get to that location plus the tide of ten feet above today's high tide.

It actually, if you think about it, this area of the Creek is completely inundated every day by high tides. So essentially it's the southern part of the San Mateo County shoreline and northern part of Santa Clara County shoreline. You can think of it as a three-mile shoreline project. And as such, it's the largest sea level rise project that' been built to date in the state of California.

So that project turns the area around it from red to green, right, because it's only surrounded by the Bay floodplain.

The next area, if you look upstream, or the bottom of Highway -- here's Highway 101. If you look on this side of it, the next project looks upstream. Currently we flood at a 22-year event. And that's flooding that would occur at Pope-Chaucer Bridge.

The objective of the first phase of our work upstream is to bring that to a 70-year event. And essentially that's equivalent to the flood of record in 1998.

Also part of our objective is to go up beyond that to the 100-year event and that would involve detaining water upstream on Stanford University lands.

The objective of that project: Getting people out of the 100-year floodplain and all we're left with is the Bay floodplain.

We have the first phase of our SAFER Bay project, which Ruben Abrica just mentioned, which is in East Palo Alto connecting them to the creek project here and going north of Bay Road. This is Cooley Landing. And also working on the north side of Highway 84 to restore the salt ponds to marshes.

What that would do is get about 90 percent of East Palo Alto properties that are in the Bay floodplain out of the Bay floodplain. So it's the first phase and we just got a big grant for that.

The next phase would be to move forward with the rest of East Palo Alto, Menlo Park, and Palo Alto and ultimately remove all the floodplains.

So that's the big picture of what we're trying to do.

I'm going to show about a two-and-a-half-minute video of what that project looks like and what the project is that we're going to talk about today.

So this is the project that was built. This is the Friendship Bridge right here.

East Palo Alto homes are on the right. Palo Alto Golf Course on the left.

The old channel was this wide. So you see what we did was we significantly widened the channel into the Palo Alto Golf Course.

COUNCILWOMAN KNISS: Is this the drone?

MR. MATERMAN: This is the drone, yeah.

So this is Palo Alto athletic facilities here. East Palo Alto homes on the right. And then the International School.

Now, this project went from the Bay and ended at Highway 101. So this next phase of work is starting where this one left off on the west side of West Bayshore Road or the highway.

That's the end of the project that was completed and this is the beginning of the project that we're talking about today. It is widening the creek right here by pushing this back to align with the new bridge.

And then upstream of Newell Road Bridge, behind two Palo Alto properties, actually a little less than that extent, is widening areas that have sacked concrete.

And this is what it looks like in the video.

There's the Newell Bridge right up there. So it's just upstream of the Newell Bridge. I will show you what that widening looks like in a little bit.

Just upstream of there also between Newell and

University Avenue, again it's widening areas that have sack concrete on the Palo Alto side. And this is the specific area, what the specific area looks like.

And then the next spot where we would do widening is right upstream. This is University Avenue so it's just upstream. This is Woodland Avenue. So we would replace this wooden parapet extension with a permanent structure. That was put in after the December 2012 flood that was mentioned earlier.

And we would also take out large concrete structures that are in the channel and again widen the channel to accommodate the increased flow that would come under the new Pope-Chaucer Bridge.

This shows the area coming from upstream to downstream. This is University Avenue.

And then the final piece of the project is at Pope-Chaucer.

This is on the downstream side looking -- so Menlo Park is on the right, Palo Alto is on the left, so we're heading upstream under the bridge. And it's really just a concrete culvert. If you haven't seen it up close or been down there, the bottom is concrete and all the sides are concrete.

So that forms the basis of our proposed project.

We're in the middle of our environmental review. Back in December of 2016, we announced it. We had scoping meetings in the early part of 2016. In April of 2019, we released the report, April 22nd. And we've been having these hearings. In addition to these hearings -- well, actually before that, it was mentioned by Gary Kremen that in October 2017 we had a series of stakeholder meetings and had a public site tour to get additional comments and ideas.

Then we also made presentations to city councils this month -- or last month. And we're moving to a Final EIR to be released late summer, early fall. Complete the process this fall and then do permitting as well as put together the financing and develop the land easements.

The idea is to begin two years of construction. 2020 would be optimistic, given these things that still need to be done before May of 2020 to get it started.

But 2021 would be the fallback to begin construction. So it would be -- in that case it would be the summer of 2021 and summer of 2022.

The outreach for EIR. Thank you all for coming. For these meetings we mailed out 13,000 postcards and there was lots of social media, electronic mechanisms.

Okay. Talking about the project area, here's Highway 101. This shows the capacities of the different bridges. The lowest number you see is Pope-Chaucer at 5,800. In 1998, the flow was 7,200 cubic feet per second. So 5,800 is less. We used to have a lot less downstream of Highway 101 but that's been changed.

So the idea here is take advantage of the natural capacity of the channel and remove the obstacles. So this is the foremost obstacle. But also in those areas that I showed you on the video, the additional obstacles that we can convey what is generally the natural capacity of the channel which is 7,500 cubic feet per second.

So to look at the overall objectives of the work, the objective here was to increase capacity by 4,500 cubic feet per second to a total of 9,400 with the sea level rise. And that's been done.

In this area, increase capacity by 1,700 to 7,500. And we picked this because, again, this is the natural capacity. This project we viewed as achievable in the near term. It's relatively limited in scope and it would be effective regardless of the duration of a storm.

With climate change we're concerned about the increasing intensity and of course frequency of the storms. And if you create capacity downstream you don't have to worry about an extra long storm that comes through, like you would if you were just detaining water upstream.

And the final piece of this to get 7,500 above the 100-year event, which is 8,150 at Pope-Chaucer is to add 1,000 CFS, cubic feet per second, detention on Stanford property.

So we're pursuing both of those at the same time. We believe we can start construction on this first, but we're also pursuing the detention upstream.

This shows the creek floodplain during the 1998 event. This is a modeled floodplain.

Today we're talking -- this shows the Newell Bridge, University, Pope-Chaucer, Middlefield. Here's Highway 101. And this shows the floodplain for a 1998-sized event. Of course most of the water concentrates down -- the deepest water concentrates here, which is what we saw in 1998.

But we saw a lot of water between let's say here and Pope-Chaucer and there was a lot of water in East Palo Alto and a bit of water in Menlo Park.

With the project built, the idea is to basically get rid of that floodplain for that sized event. It doesn't get rid of the 100-year floodplain, but it reduces significantly the floodplain for the 1998 event.

The objectives of the project, protect life, property, and infrastructure.

Enhance the environment.

Connecting to recreational opportunities.

Minimize operations and maintenance requirements.

And not preclude future actions like the upstream detention.

The three fundamental approaches that we started looking at a long time ago, years ago, was either contain the water in the channel through the floodplain area, detain it upstream, or bypass the water in the floodplain area.

This resulted in a series of alternatives we proposed in December of 2016. We proposed five. Based on the scoping process and the stakeholder workshops we had, we added an additional 12 so we had 17 alternatives described in the EIR.

In the EIR there was a table, Table 2-1 -- feel free to look at it or ask about it -- but we went through the 17 alternatives and how they scored in terms of each's ability to meet the project objectives.

What came out of that process were basically four alternatives that went to the next level of screening. And that's also a table that's in the EIR and it's screening it for feasibility. Feasibility in terms of costs, technical aspects or logistical feasible.

What kind of came out of that process were three alternatives, in addition to no action or no project alternatives, which is a requirement of CEQA and something we need to analyze.

But those three alternatives are listed here.

Replacing Pope-Chaucer Bridge and do widening. That's the current project that I described.

Replacing -- number 5, replacing Pope-Chaucer Bridge and building flood walls downstream.

Or number three just doing the detention basins.

The detention basins, this is what the proposal looks like. These are the basins that are still in consideration and we're pursuing.

Searsville Dam and reservoir is a project that Stanford has stated is its preferred alternative to address fish migration issues and it would also provide significant flood protection.

We've been working with Stanford for a while on that. And if we have questions about that we would be glad to address them or comments about that.

We looked at two additional detention basins, the site of the former plant nursery recalled the Boething Nursery, right there. And also the site of Webb Ranch.

Basically what we would do for those two is we'd take the current topography, dig a hole. It could still be used for the U-Pick farm, for example, at Webb Ranch. But it would be a hole that would then fill up when the capacity downstream at Pope-Chaucer in this area was exceeded. And it would capture the peak flow for a certain duration of time, about 1,000 cubic feet per second.

And again, the concern with just relying on detention basins only is that if we have a very long storm and the basin becomes full, then it doesn't have any value as a flood protection facility.

This is what the flood wall alternative looks like. Here's Highway 101, here's University Avenue, here's the Pope-Chaucer Bridge.

I think it is worth noting that Pope-Chaucer will be closed during construction for eight to nine months. And that's something we'll talk about in a few minutes.

The flood wall alternative has replacement of the Pope-Chaucer Bridge, constructing relatively small flood wall in height, but fairly decent extent of the Creek between Newell Road and upstream Lincoln on the Palo Alto -- yeah, the Palo Alto side. Also replacing that wooden parapet that I mentioned and showed in the video. And matching the Palo Alto top bank behind the homes.

That's what the floodwall alternative looks like.

The preferred alternative, which is widening, you'll see the difference right now. It's much less extensive. The green areas are the widening areas. So this is the extent of the flood walls. This is the extent of the widening. It's a less impactful, less costly project as you can see just from the geography, which is a large reason it became our preferred alternative.

All of the alternatives, as I mentioned during the video, this is West Bayshore Road. Behind that is Highway 101. This is looking downstream toward the Bay. This area was closed off during the construction of the highway, but there is another culvert there. There are three culverts here. There's a fourth one that was added. And what we want to do is open this back up to creek flow.

In terms of widening, I mentioned certain areas where the Palo Alto bank has sack concrete on the side. And we've actually widened behind these homes.

The image -- this is what it looks like behind one of those homes. That is a home between Newell and University. And this is a drawing of what it looks like.

So the creek channel is right here. Palo Alto homes' backyards are here. And there's sack concrete.

And when I advance the slide, you will see what it looks like.

So we remove the sack concrete and earth behind it and then build what's called a soil nail wall. These are soil nails that go a maximum of about 25 feet underground under these properties to hold the walls, create stability for the wall against the creek bank.

And then we do plantings at the bottom of native plants and as well as the top. And we have the increased capacity again one more time. You can see how that works.

This is what the wooden parapet extension looks like. We call it a parapet extension because it is an extension of the bridge parapet here, about the same elevation, and just goes out several hundred feet. It was put in, again, by East Palo Alto after the December 2012 flood and we want to create a permanent structure there.

This is another area of widening. This is a large concrete structure. The Four Seasons complex is right on the other side of that wall. It's across the street on the other side. And we would remove this and create a natural creek bank. This is on the East Palo Alto side.

Pope-Chaucer Bridge. This is a view looking downstream of the bridge. On the right side is Palo Alto, the left is Menlo Park.

And that's what it looks like today on the top. And on the bottom is the proposed bridge. You can see there's a lot more capacity under the roadway. The roadway would be slightly elevated from what it is today. And the bottom image shows what we anticipate it would look like after one to two years of vegetation growth.

So this is an aerial view of what it would look like right after construction before the vegetation comes in. Palo Alto is on the right side, you see Chaucer Street labeled there.

And this is what it would look like after a couple years of growth.

And again, this is kind of what it looks like looking downstream.

So we also can take comments on the actual bridge and what you think of it.

And there's also going to be a process to get the bridge approved by the City of Palo Alto that residents of Palo Alto and others can weigh in on.

The preferred project in the EIR, we looked at 15 different categories that are in the box below ranging from aesthetics to utilities and compared each of the three alternatives against them. And we came up with either no impact or less than significant impact, or significant that can be mitigated to less than significant or something that's significant and unavoidable.

There were two impacts that were significant and unavoidable. Noise -- both of them were during construction. One was just the result of the project. It was noise. And then the second one was a cumulative effect of our project, as well as other sources, especially Highway 101. And that was air quality. Again during construction.

We also looked at impacts that were significant that our EIR consultants felt could be made less than significant as a result of mitigation. And there were a lot of those. And they range in all of these different categories here. All of these are during construction.

There were really three permanent ones related to biology, geology and hydrology.

We'll talk about a couple of these in a minute. Actually, right now.

So we picked out a few of these that we thought the population would be particularly interested in: Trucks, traffic, trees and noise.

And so in terms of traffic, we looked at these intersections that have circles, green or red circles and we found that the intersections adjacent to Middlefield -- where Middlefield crosses the Creek on both sides, on the Menlo Park and Palo Alto side, there would be a significant increase while Pope-Chaucer Bridge is closed. Only during that period.

And so to mitigate for that, we're proposing a temporary traffic light there. Now, I have to say the City of Menlo Park is looking at more permanent solutions for that intersection and they've approached us to say -- to talk about whether we put a temporary light in there or whether they do something either on a temporary or permanent basis. That's ongoing. But I did want to say we view that intersection as being problematic during the closure of Pope-Chaucer Bridge.

The other ones weren't found to be a significant impact.

In terms of during construction, the traffic, maximum traffic increase, is 60 trips per day. You see there truck and worker traffic. Most of the workers would be related to the Pope-Chaucer Bridge replacement. That would be the greatest area of concentration.

In terms of truck haul routes, it's from the areas where we're doing the widening and the main route is to go to University Avenue to Highway 101.

When the work is being done at West Bayshore Road, there will actually be an impact there.

In terms of noise, these are the areas where the major work would be done. And so the noise would be fairly concentrated, as you can imagine, during the construction activity. But it would be pretty diffused outside of these areas.

So if you live or are concerned about one of the areas that is indicated by the circles, you may want to kind of take a look at the document in this regard and think about it.

We're doing everything we can to reduce the impacts of noise and vibration from work. And especially the area we're most concerned about is at the Pope-Chaucer Bridge. And our consultants who are working for the Santa Clara Valley Water District, our lead consultant is here and he can talk about that. But we're looking at different approaches to reduce noise right now.

But what we put in the document is kind of the worse-case scenario, in case we can't find something to reduce it.

Trees. We've had comments about trees already. And there will be trees that we remove primarily at the Pope-Chaucer Bridge. And some trees associated with the areas where the widening is. But not very much in the downstream of the Pope-Chaucer Bridge.

We're trying to reduce the amount of trees, especially at the bridge. And again, that same consultant is trying to reduce the footprint of the project so that we take as few trees as possible.

Most of the trees that would be taken are actually growing out of the concrete in the bridge. And as you may know, the bridge is not just the roadway. Especially on the downstream side, there's quite a bit of nice area. The area has trees, most of them were planted in 1990s, but they're growing out of the top of the concrete culvert. And removing the culvert, the only thing you can do when you remove the culvert is get rid of the whole piece of the culvert and that includes whatever is growing on top of it.

So in summary, again the project objectives upstream are indicated here. We estimate completion date at the latest, December of 2022. We have a longer horizon for upstream detention. That's just because there's more uncertainty. But again, we're pursuing that as well.

So, that's the presentation. If you have -- we're now welcoming comments, public comments. If you have questions we'll try to answer questions as well.

As Director Kremen mentioned, we have a court reporter here. She's here to document your comments that will then be included and responded to in the Final EIR that comes out in a couple months.

So this is mostly about comments. But if there are questions too we will entertain those.

Yes, sir?

And then just before you start, I know she's going to say: If you can speak up or speak clearly. There is a mike. You're welcome to use it. If you feel like you can project, you don't need to. But I want to ask you to speak up.

AUDIENCE MEMBER: I'm pretty loud.

PH3-1 So is the Newell Bridge, the finishing time is about the same as this one? 20 -- a two-year projection of construction?

MR. MATERMAN: Yeah. I'm actually going to defer to the Palo Alto staff. That's a Palo Alto project, as was mentioned by Councilwoman Cormack.

That's a Palo Alto project that we're working with. To try to exactly get to your point, I'm going to defer to Palo Alto to answer that question.

PH3-1 Con't

MS. JEREMIAS: I'm Michel Jeremias, City of Palo Alto, Public Works.

Thank you, Mike, for the question.

Yes, we are working together with JPA and with Palo Alto to make sure that we segue the construction. Part of it is, currently we are -- we both -- we have two EIRs in place. We need to get both EIRs certified and then go through the permitting process.

We are aware that it will conflict and add more traffic to University Avenue. So we have made agreements that we were going to work together to try to alleviate and reduce the impact.

That means that right now we're on the same schedule, but there are a lot of things ahead of us before we can get started and complete the project.

PH3-2

AUDIENCE MEMBER: And then the last question is we noticed that on -- close to the Newell Bridge, there's a little blue circle where the expansion will be.

Will that be affecting the properties' backyards? Will work on that -- as you know, we're on location.

Is that going to be affecting the property's, I

PH3-2 Con't

guess, the dimension or the lot line?

Or is it going to be upper -- more of the upper or north side that might be the Four Seasons or something?

MR. MATERMAN: So, if you're asking about your specific property, I need more information about where you are at.

AUDIENCE MEMBER: We're at 1499 Edgewood.

MR. MATERMAN: And how many parcels are you up from Newell or down from Newell?

AUDIENCE MEMBER: Well, we're right at the corner of Edgewood and Newell.

MR. MATERMAN: Oh, okay. Then our project will not impact you. Our project is a few houses farther upstream from your property. Yeah.

Actually I wanted to the add one thing about the timing. We can replace Pope-Chaucer simultaneous to the replacement of Newell. But we can't do it before. So Newell essentially has to happen before or when we do Pope-Chaucer. So that is a limiting factor on the ability to complete this project.

Yes, ma'am?

PH3-3

AUDIENCE MEMBER: -- where are the pictures of what Newell Bridge would be?

MR. MATERMAN: Yeah, so, the City of Palo Alto,

PH3-3 Con't

as was mentioned a few minutes ago, I think on Friday, released it Environmental Impact Report and has a series of public meetings scheduled for the second half of June, I believe.

Michel, do you want to --

MS. JEREMIAS: I'll face the audience.

We will have a similar meeting as this. We will be able to provide and share the information and photographs and show the proposed bridge, show what we're looking at as far as the alternatives.

And right now as Len mentioned, we do have an EIR available for the public. It's available through our construction page and we actually are trying to get also a news detail will be released shortly. E-blasts as well to the public. So if you haven't received notice, there will be additional information available on our page.

PH3-4

AUDIENCE MEMBER: It's a DEIR, a draft EIR?

MS. JEREMIAS: It's a draft EIR

MR. MATERMAN: Yes, sir?

PH3-5

AUDIENCE MEMBER: According to the maps you have back there, and your discussion, even if the bridge is replaced, it can only carry 70 percent, not 100 percent of the 100-year flood.

And in order to really mitigate flooding potential, you have to have upstream retention on

PH3-5 Con't

Stanford land.

MR. MATERMAN: Correct.

AUDIENCE MEMBER: The fundamental question I have is: Stanford is not here. Are they going to allow retention on their land? Or are they going to say: Oh, yeah, we'll give it to you if you let us build another 200 square feet of offices or whatever. Stanford is always very modest in their requests.

PH3-6

And also, the map that you showed there of the flooding potential, I don't think -- the very first one you showed. I don't think that's completely accurate.

I went to the USGS Centennial Event in 1996. And they were talking --

Yeah, that's the one I'm talking about. There, that one.

MR. MATERMAN: Yep.

AUDIENCE MEMBER: And they had some maps of what this area looked like 120 years ago. This was marsh. And the Bay actually extended across Middlefield about halfway between Middlefield and Alma.

So this area is subject -- and that's before we had the sea level rise.

So this area is subject to flooding, if we have the kind of sea level rise you're talking about. Mountain View is already talking about putting in sea

PH3-6
Con't

walls, basically. And if they put a sea wall in Mountain View it is going to divert the water to Palo Alto. What are we doing?

AUDIENCE MEMBER: Where do you start?

MR. MATERMAN: So wait, I'll take away from that two questions.

One is: What is the plan with upstream detention?

And I'm trying to formulate a question regarding the marshes and the flooding and the maps.

So, these -- let me just do the second one first.

These maps are basically -- take the FEMA flood maps. They're not intended to reflect, necessarily, reality. Although, if you look at Palo Alto's flooding experience in '98 and you look at the FEMA flood map, it's pretty close. And East Palo Alto as well, pretty close.

So these maps are really based on models and -- hydrologic models rather than people's experiences and communicating what streets were underwater and things like that.

In terms of Stanford and upstream detention, as I mentioned, it's an important part of the overall project. In fact, as you indicated we don't believe that

PH3-6
Con't

100-year protection can be achieved without it. Because a downstream project that achieves 100-year protection just between Pope-Chaucer and Highway 101 would change the creek very significantly in a way that the community is not supporting.

In terms of encouraging Stanford to accept that, we are certainly working on that. We've been working with Stanford for a while on trying to coordinate our efforts downstream with its preferred project at Searsville Dam and Reservoir, which, as I said, would provide a real and actual flood benefit.

And then we're also examining these other options if the Stanford chooses not to pursue the project at Searsville.

We've said publicly that our first choice would be that Stanford did that project. That's their first choice too. Whether they do it or not, though, is their decision and if they choose not to, then we'll pursue a different project on Stanford land.

Hopefully that would be done in collaboration with Stanford. But maybe not. So, that's the best we can answer today.

I don't know if -- yeah. Okay, before I say too much more.

Yes, ma'am?

PH3-7

AUDIENCE MEMBER: So back a few maps where you showed where Palo Alto is flooded. And then you showed where it would be not flooded after.

In that map, I happen to live in the island (inaudible). It took a big hit. It still had water on it and I was really surprised.

MR. MATERMAN: You were surprised by what I show based on your experience.

AUDIENCE MEMBER: No, as to what hope we have of getting relief from the project.

MR. MATERMAN: Were you pleasantly surprised?

AUDIENCE MEMBER: No, I saw --

MR. MATERMAN: Is this the map you're talking about?

AUDIENCE MEMBER: Yes.

MR. MATERMAN: And so afterwards you saw -- Oh, I see. After the project is done you still see --

AUDIENCE MEMBER: I see white where some -- it's -- and I see a lot of water around that.

MR. MATERMAN: You have very good vision, first of all.

So, let me just say, the experience that we're aware of from the 1998 event, which is the event we're aiming to solve against, is that the flooding resulting from Middlefield Road Bridge was street flooding and not

PH3-7 Con't

flooding that flooded anybody's homes. That's --

AUDIENCE MEMBER: I'm still saying that's --

MR. MATERMAN: No, I understand. I understand.

So by replacing Pope-Chaucer Bridge and widening downstream, what we're basically saying is that water that goes under Middlefield, the maximum amount, will not come out downstream of Middlefield in the Bay.

So what that means is all the water that comes out in a 1998 event would be replicating what we saw just from Middlefield. And the water that I think you saw in 1998 was from Pope-Chaucer not from Middlefield.

AUDIENCE MEMBER: Right. That's why I was surprised to see water --

MR. MATERMAN: So this represents street flooding. I want to just contrast it with the darker blue that represents deeper flooding. This is intended to be representative not to replicate your street or --

AUDIENCE MEMBER: I am concerned.

MR. MATERMAN: Okay.

AUDIENCE MEMBER: Deeply concerned.

MR. MATERMAN: Okay. And your concerns are that the project we're proposing doesn't solve the problem at your street.

AUDIENCE MEMBER: Right.

MR. MATERMAN: Jim?

AUDIENCE MEMBER: Len, I have three questions.

First one is that five years ago when you did the scoping or whatever that process was called, you told us that the Pope-Chaucer Bridge would not be closed and it would actually be crossable in some form during the construction.

What changed?

MR. MATERMAN: Well, we looked at -- so you may be referring to -- and I can't remember what I said in 2013, but there was a process that was scoping in 2013, six years ago, and we may have been looking at not closing Pope-Chaucer. The equation that we came up with in working with the cities now with Pope-Chaucer is really related to inconvenience to the community.

PH3-8

If we did not close it, it would be two years of construction just at Pope-Chaucer rather than this eight- to nine-month period.

Cost. It's much more expensive to keep traffic going over that expanse during construction for two years rather than letting the contractor go in there, demolish the bridge and as quickly as possible rebuild it.

And permitting. Permitting -- regulatory agencies said to us they didn't want us to work in the channel for two years if there was a way to do it one year.

So those were the three parts of the conversation that we went to the cities of Menlo Park and Palo Alto and said what do you think and we came to a consensus that was our approach. So that's our proposal.

AUDIENCE MEMBER: Okay. Thank you.

Again six years ago you released a lot of detailed information about the Pope-Chaucer Bridge possibilities. This time we don't really get a lot of detail in the EIR, but it's not the function of the EIR to do that.

But how is the bridge different now than it was six years ago?

PH3-8
Con't

MR. MATERMAN: I think six years ago we were trying to convey a 100-year event at Pope-Chaucer and not --

AUDIENCE MEMBER: With flood walls.

MR. MATERMAN: There was a higher -- there was a higher depth to the bridge to allow more water to go under it and there were flood walls alongside of the bridge and upstream of the bridge to kind of force the water through.

AUDIENCE MEMBER: Six years ago that was the 100-year plan.

MR. MATERMAN: Right.

AUDIENCE MEMBER: And there were two bridge

PH3-8 Con't

designs: One that was elevated by a few feet, a few -- somewhere between inches to feet and one that was elevated by four feet. This bridge looks identical to the one that we had six years ago, the lower one.

Is it different, the lower one? Has anything changed?

COUNCILWOMAN KNISS: Can you show --

MR. MATERMAN: And I'm going to see if maybe --

AUDIENCE MEMBER: Maybe somebody else can say if there's any change.

AUDIENCE MEMBER: Good evening. I'm with the Water District. I believe the alternative that we are proposing right now is pretty much the same as the one we had before, which basically is not carrying 100 year without -- I mean any free flow 100 year.

But if we have flood walls on both sides of it, it can force a 100 year flow into the creek. But that's not the intention of the bridge we are doing. But it's very similar.

MR. MATERMAN: The bridge is similar without the flood walls.

AUDIENCE MEMBER: Without the flood walls; that's correct.

MR. MATERMAN: Okay.

AUDIENCE MEMBER: So the question was how is it

PH3-8 Con't different if it is similar? But I'll catch him later.

The final question, I'm sorry, I wasn't at the previous meetings. Apparently this question came up.

The DEIR says, at best I can read, that two trees would be removed at Pope-Chaucer Bridge, which is obviously not correct. If that's so badly represented in the DEIR what else --

MR. MATERMAN: That's not in the EIR. The number in the EIR, let's see -- Kevin, do you know? Kevin MacKay is --

AUDIENCE MEMBER: The two oak trees in the --

PH3-9 MR. MATERMAN: No, it's a couple dozen I think in the EIR.

Kevin will look it up. It's simply not two.

The EIR represents the trees that are out there that are within the footprint of what we think will be the design of the bridge.

Now as I said, we're trying to kind of reduce that footprint to reduce tree removal. But certainly, too, if anybody was giving you the expectation it was two, they were mistaken. The document does not --

AUDIENCE MEMBER: That's -- we can take that offline.

PH3-10 How much traffic do you -- increase do you expect? I guess that's in the EIR somewhere? The count

PH3-10 Con't

at the Woodland-Middlefield intersection?

MR. MATERMAN: So, there's a -- a whole appendix on traffic that --

AUDIENCE MEMBER: I looked at it.

MR. MATERMAN: -- detail. And then there's a section in Chapter 3 that's dedicated to traffic.

So I can't say specifically, other than the summary that I provided. But I would encourage you -- I mean, that's an important issue, especially if you live on Woodland. And so I would encourage you to make a comment about that, because that's a big thing.

AUDIENCE MEMBER: Thank you.

MR. MATERMAN: Yes, sir, you had your hand up many times.

Either of you. In the hat or behind.

PH3-11

AUDIENCE MEMBER: Thank you. Thanks for doing this. I think it is phenomenal. So I just had the same question, I'm sorry, that gentleman that if you are widening behind my backyard, is that going to impact my size, my backyard? That's the question I had.

MR. MATERMAN: Yeah, so if we're widening behind your property -- and we should talk after the meeting if that's the case.

If we're widening behind your property, then the impact is really underground. If it's just the soil nail wall area.

We're going need to talk to you about getting an easement, underground easement. There wouldn't be anything outside of our right of way in your backyard above ground.

AUDIENCE MEMBER: What about like --

MR. MATERMAN: And the work would be done from within the channel rather than coming through the Palo Alto side, if that makes sense.

PH3-11 Con't

AUDIENCE MEMBER: We are on the Palo Alto side.

MR. MATERMAN: Right. Right. I'm just saying the work will be done from the bottom of the channel, not from your property.

AUDIENCE MEMBER: Okay.

MR. MATERMAN: But we should -- please stick around, because if you are impacted -- because I've already met with the vast majority of the property owners, but I don't think we've met. So if that's the case, we should --

AUDIENCE MEMBER: We just moved in last year.

MR. MATERMAN: Yeah.

MR. MARTIN: My name is Paul Martin. I'm here from Palo Alto. I had two comments, actually.

PH3-12

The first one was, I and maybe a lot of other people in the city, really appreciate the walkability and

PH3-12 Con't

bicycles. So I saw two options there for eliminating vehicle traffic both here and also on Newell.

And I think for me, those would both be options that would be very positive.

Second thing was, kind of stacking on some of the other comments, the 100-year floods are kind of going to come at much less than 100 years. We should be really realistic about that. So the 100-year floods becoming 20-year floods is maybe more realistic.

And then with that, the plan kind of is 10 percent below the new 20-year flood. So, because it's 7,500 instead of what is today, the 100-year flood which will become the 20-year flood, which is 8,150 if I read your charts correctly back there.

PH3-13

So if you take the assumption that this 100-year flood is kind of old news and we're working in a world where the 100-year flood is now the 20-year flood, you know, are we doing enough to protect our city?

MR. MATERMAN: Well, okay. Thank you for that summary of your question.

What I would say to that is we are -- my objective for this project is to propose something that's meaningful and achievable.

In the 89 years that we've been measuring the flow on this creek, since 1930, the greatest flow by far

PH3-13
Con't

was the 1998. We had a large flow in 1955, we had a large flow in 2012. We've had other large flows.

But in 1998 was the only flow that exceeded Pope-Chaucer. So in the 89 years of measuring, we're able to provide, on a short-term basis -- relatively short term, couple years -- protection against that.

I think that's meaningful.

Does it solve the problem for a larger event? No.

If a larger event comes, does that make the event less impactful? Absolutely.

If you protect against the 70-year event and you suddenly get a 75-year event, that's going to be a pretty minor event. But if you don't do this, that's going to be a major event.

Everything we do helps a lot. Whether the 100-year event is the new 20-year event, people -- a lot of people are looking into what the 100-year standard should be and what it will look like during the era of climate change and extreme events. We don't know that.

What we do know, as mentioned earlier, this is a very, very constrained area by roads, utilities, private property, and natural -- and a natural system. And within the context of all those constraints we're trying to build a project that is the largest possible

PH3-13 Con't

given all of those constraints. And then also take advantage of detention.

So that's our strategy. And, you know, we welcome comments if there are other strategies that could get us beyond that.

It doesn't mean that we're -- the gold standard of 100 year is where we want to stop. If we can build two detention basins, if that would work, we can build two detention basins.

But I didn't want to propose a project -- we tried that in 2013. I didn't want to propose a project that would achieve more but never get built.

Yes, sir?

PH3-14

AUDIENCE MEMBER: I had a question. You mentioned earlier Searsville Dam.

MR. MATERMAN: Yes, sir.

AUDIENCE MEMBER: I read through the parts of the DEIR that I could. And there was a really, really brief discussion about Searsville. And it just strikes me as odd that there's not a more forthcoming discussion about the latest conversations with Stanford, because any project that's built upstream, whatever they choose to do, no action, punch a hole in the base of the dam, remove the dam, whatever it is, is going to determine the success or failure of every single structure that is built downstream, because necessarily there's going to be sediment involved.

So my question is: How come there's not a description, a better description, in the DEIR of what those assumptions are going to be?

I mean, to me that's the crux of this entire thing. What I don't want to see is to get pigeonholed into the options that we have because of trying to guess what Stanford is going to do. There are a lot of ways to build it wrong for whatever choice they make upstream. And what we determine down here shouldn't refer to the option of what Stanford does upstream.

PH3-14
Con't

MR. MATERMAN: Right. Well, we agree that what we do here should not preclude options upstream. And it should enable Stanford to do work upstream and not make it more difficult. And by opening up the system downstream -- and we've looked at sediment issues carefully. In fact, that was probably the greatest area of focus over the past 12 months in our work with the Stanford consulting team, which are hydrologists and geomatolgists to look at, okay, if they do nothing at Searsville what does sediment look like if we build this preferred project?

If they put a hole in the dam, what is the sediment regime going to look like? And what's the maintenance required?

And what are the flood protection impacts it -- if they put a hole in the dam and we build this project?

So we looked at all of that. And then there are all these scenarios by opening up Pope-Chaucer, it reduces the impacts of sediment from upstream.

PH3-14 Con't

If you look at the current situation at Pope-Chaucer, a lot of this is actually just sediment that got stuck behind this wall over decades. Right?

And by opening it up, there will be sediment that pools occasionally, but it will get washed out during high flows and it won't get stuck behind these relatively narrow piers. So this is designed -- and our designers can describe that in more detail.

But what we're trying to do, as you said, is enable work upstream. And you know, please comment on that and provide us with a written comment and in the Final EIR, perhaps we can describe that further.

PH3-15

AUDIENCE MEMBER: Then I guess just follow-up suggestion would be to have that sediment study of the different alternatives as an addendum or appendix to the DEIR. It would be wise, because it's difficult --

MR. MATERMAN: Right. Understood.

AUDIENCE MEMBER: -- kind of shooting in the

PH3-15 Con't

dark making comments, because you don't know what those assumptions are or what's likely to happen upstream.

So I guess if we include it in the public documents, we can see it and then make informed comments on that.

MR. MATERMAN: Understood. And maybe catch up with Kevin MacKay standing right behind you there, because he's thought a lot about that as well.

Yes, sir, you had a comment?

PH3-16

MR. WARNER: I'm Dave Warner. I live on Palo Alto Avenue and I live along the creek. I was here a few years ago when they did the walking tour.

I really just wanted just to say what you've done, what the Board's done and what the City of Palo Alto has done and what the City of Menlo Park's done, the idea of let's get something done in a meaningful period of time -- while our house itself didn't flood, some good friends' did. And I just want to emphasize, I think what you've done, what choices you've made, are just outstanding.

Relatively --

(Applause.)

AUDIENCE MEMBER: I don't want to take a lot of time.

How you work with all these organizations and

PH3-16 Con't

how you got everyone to agree and come to a consensus, I just want to say thank you.

MR. MATERMAN: All right. Thank you.

Okay. Yes, sir?

PH3-17

AUDIENCE MEMBER: So, Len, I want to commend you on a wonderful plan. Get it done.

MR. MATERMAN: Thank you for your comment.

Let's see, who hasn't had a -- yes, sir?

PH3-18

AUDIENCE MEMBER: I have just a comment.

The proposed design resembles the historical bridge which was there before the culvert. And of course it occurred to me: Why was that put there in the first place? Because it clearly was a flow obstruction. And this one, once again, restores the flow in an aesthetically pleasing manner and, boy, that is what I've been waiting for.

MR. MATERMAN: So, there's one hypothesis out there of why this culvert was placed.

Does anybody know what that is?

I will give you a clue, it was put in there in the late '50s.

The hypothesis -- so you're right, the Pope-Chaucer Bridge, we have a picture of it from I think 1907. I might have gotten it from you, Norm.

The Pope-Chaucer Bridge was basically a

free-span bridge. And in 1955 was a major, major flood that was mentioned earlier by Ms. Kniss. And the idea was that to reduce flooding downstream, the culvert was put in there and it was sized to match the 1955 event.

Jim, do you have --

PH3-18 Con't

AUDIENCE MEMBER: There was a little more history. There's actually blueprints that show that the 1955 event, there was some undermining of the bridge. And they actually constructed this bridge inside the other bridge. And so that's what was left.

And as to the actual size of it, there was a theory I heard that each of the bridges was supposed to shed, just like it naturally does, an equal amount of water. Because when the creek normally floods, it floods all along the channel at the same time.

MR. MATERMAN: Sure.

AUDIENCE MEMBER: And the bridge was built inside the old bridge.

MR. MATERMAN: Let's see. Yes, sir?

PH3-19

AUDIENCE MEMBER: Did I understand you correctly to say that this project cannot begin until the Newell Street Bridge project begins?

MR. MATERMAN: No. So what I said was the Pope-Chaucer Bridge cannot be rebuilt before Newell is rebuilt.

It can happen -- no, no. It can happen simultaneously. And other aspects of our project, you know, we have -- we have all these different locations to work, right?

PH3-19 Con't

So, for example, if Newell is being rebuilt during 2021, let's pick a number, pick a date, we could work here upstream at University, for example.

All I'm saying is this cannot be removed as a constriction before this; right?

AUDIENCE MEMBER: Simultaneous?

MR. MATERMAN: That's possible, yes. Yes.

Okay. So, Norm and then -- go ahead.

AUDIENCE MEMBER: One of your slides had University Avenue as capacity less than 7,200.

So how does that jibe with the idea of passing 7,200?

PH3-20

MR. MATERMAN: Yep. Good question. The question that we've asked also of the hydrologist.

And what you noticed is that there's widening on both sides; right? And there's the replacement of that wood structure just upstream and matching height on the Palo Alto side. So all of those actions enable more flow to come under the bridge than currently can by forcing more water through.

It's a good question and I wondered the same

PH3-20 Con't

thing. But the hydrologists looked at this several times and said the University Avenue Bridge doesn't have to be touched to solve this problem.

Yes, ma'am?

PH3-21

AUDIENCE MEMBER: So, I live on Edgewood Drive in the little -- the circle on the right side there. And there's a large tree in my backyard, an oak tree. But it doesn't seem to be in the EIR. The EIR seems to be mostly focused upstream, the Appendix B, the Tree Report.

MR. MATERMAN: Are you near West Bayshore?

AUDIENCE MEMBER: Yes. My house is right on the corner there where the creek bends.

MR. MATERMAN: Okay. So, I'm not sure how to answer that question, but I'm going to ask Alec Nicholas, who's the project manager with the Santa Clara Valley Water District.

Alex could you raise your hand?

MR. NICHOLAS: Yeah, right here.

MR. MATERMAN: And so would you mind talking to Alec after the meeting, or at any point tonight, because he's been working on the design for the West Bayshore inlet and it might be good if you guys connected.

If you have a comment, please provide a written comment about that.

PH3-22

AUDIENCE MEMBER: I live in East Palo Alto and my kids are attending school in Palo Alto schools. We ride bikes across the Pope-Chaucer Bridge. With both the Pope-Chaucer Bridge and the Newell Bridge being out at the same time, it's going to greatly impact the vehicular traffic at Woodland and Middlefield making our bicycle commutes much more dangerous.

So as a bicycle commuter with two school-age children, I would encourage you guys to think about the impact that it will have on bicyclists.

PH3-22 Con't

MR. MATERMAN: Yeah, we're hoping that Pope-Chaucer and Newell are not rebuilt at the same time. That's our intention for many reasons, including the one you just mentioned. Vehicular traffic as well, of course.

So that's just something that the city and JPA are going to have to closely coordinate on. But that's a very good point.

Other -- I -- anybody who hasn't made a comment yet? Go ahead.

AUDIENCE MEMBER: I just wondered about open traffic on the bridge before and after construction. Is there any way that a bicycle lane could be kept there on the Pope-Chaucer Bridge before construction and after?

PH3-23

MR. MATERMAN: Well --

AUDIENCE MEMBER: Or walking open?

PH3-23 Con't

MR. MATERMAN: During construction?

AUDIENCE MEMBER: Well, during, but not during the hours. Is there a way to have that -- I live on Woodland and -- right on Woodland near Menalto.

MR. MATERMAN: Unfortunately --

AUDIENCE MEMBER: It's so easy. You just cross the bridge and go to University Avenue to get into downtown Palo Alto and dentists and doctors.

MR. MATERMAN: Right. Understood.

AUDIENCE MEMBER: And his children going to school.

MR. MATERMAN: Right. Unfortunately, our proposal is to close the bridge for the reasons that I mentioned previously. And obviously there are impacts to that and we understand that.

And you know, these comments about that, that's the best we can do.

Yes, Jim?

PH3-24

AUDIENCE MEMBER: I have two specific suggestions to be considered.

Could we put the bridge picture up again for a second?

MR. MATERMAN: Sure.

AUDIENCE MEMBER: One of the things that people like about the Pope-Chaucer Bridge, a lot of people don't like it, but one thing they like is that when you're crossing that bridge, you don't even realize you're on a bridge. You feel like you're still in a forest because there's mature vegetation on all sides. You really don't even know there's a bridge.

PH3-24 Con't

This changes the character of that bridge tremendously. And as an homage to the trees that we had, I would suggest that rather than use these little bulb-outs as viewing decks, because nobody wants to look down at boulders, why not put cement planter boxes in those four bulbs and fill them with oak trees? One seed each would do the job and would change the character of the bridge quite a bit back to something much more similar.

So it's something to think about.

MR. MATERMAN: Okay. That's a good comment.

AUDIENCE MEMBER: The second suggestion is to build out to the -- it's a comment related to the bike and pedestrian access.

PH3-25

I would encourage you to look at the feasibility of putting in a temporary bike bridge across the creek somewhere far enough away from the construction that it doesn't impact the construction. You see these things where they just truck them in and then lay them down and you have a bridge.

PH3-25 Con't

If you are doing it only for pedestrians and bikes, it doesn't have to be a heavy-duty structure. So that might be a good way to maintain some access.

I know where I would put it but that's --

MR. MATERMAN: Thank you. Thank you, Jim.

Did you have a comment, ma'am?

PH3-26

AUDIENCE MEMBER: Yeah. It just seems to me concrete is a bad way to work with nature. I'm wondering if you really looked at instead of doing the soil nails and concrete on the sides, proper vegetation, dense tree roots and trees, I think would be a safer way to protect the soil for generations.

Has that been looked at?

MR. MATERMAN: We did. So we looked at the risks -- we looked at what velocities would come through the channel at 7,500 CFS, which would be the maximum.

And let's see -- well, so we looked at the velocities that would come through and looked at the different treatments that could work.

Essentially, in these areas, because of the private property back here, there isn't enough room to scale it back at an angle such that it would survive those velocities with the natural treatment.

In the one area that we are proposing that is the removal of this, where there's enough room between the bottom of the channel and Woodland Avenue on the other side of that wall, here, where we actually are going to turn this into a natural bank. It looks like this is natural, but this concrete is just a terrace that goes up and these trees are growing out of the concrete.

PH3-26
Con't

But this is the one area that we didn't have to take basically people's backyards, which is what -- something we didn't want to pursue as part of the project.

AUDIENCE MEMBER: The other thing I was concerned about, is there going to be regular maintenance of the things that naturally fall into the creek or people throw into the creek?

Some years the rains start and there's a lot of junk in the creek which slows everything down.

MR. MATERMAN: Yeah.

AUDIENCE MEMBER: Is that part of the plan to have that maintenance?

PH3-27

MR. MATERMAN: So every September, sometimes in August, depending on the year, the JPA coordinates what we call a maintenance walk. And it involves staff from the three cities, Santa Clara Valley Water District, San Mateo County, Stanford University, others I think, Acterra, I think. And we look for items that need to be removed or large trees that have fallen that can't be removed for environmental regulatory reasons, but they can be cut up into smaller pieces so that during the next high flow they can wash downstream and not get stuck at a bridge. So that is going to continue.

We're also going to monitor erosion on the creek banks. And if there are specific sites that are noticeably, you know, impacted by the project in terms of erosion, then we'll deal with that. And that's going to be part of the adaptive management plan existent after the project.

PH3-27 Con't

And we're going to monitor sediment deposition for the reason I described before. Especially if there's a modification to Searsville, or when the Searsville Reservoir fills with sediment and then water and sediment just spill over the dam, which will happen at some point, then no matter what in the future is expected in the next 15 to 20 years, there's going to be a change to the sediment regime. And we'll have to manage that.

We don't expect, because of the reasons I talked about, we don't expect to have to go in there and dredge sediment. But we're definitely going to monitor it closely.

PH3-28

AUDIENCE MEMBER: One more thing. I have seen the YouTube video of a neighbor who took a raft and went the whole length from Stanford to the Bay. It is quite

PH3-28 Con't

interesting to watch. He doesn't say a word and he was all by himself. But you get to see exactly what it looks like, the whole channel. It's quite interesting.

His name is Manfred. I'm blanking on his last name. If you just Google on YouTube or look on YouTube you will find rafting the creek.

AUDIENCE MEMBER: Hyatt.

AUDIENCE MEMBER: Is it Hyatt?

MR. MATERMAN: I want to give a chance -- anybody else have comments? Yes. And then I'll come back to you.

(Interruption by court reporter.)

PH3-29

AUDIENCE MEMBER: I'm Nancy Lianides with Allied Arts Guild affiliated to the Lucille Packard Children's Hospital.

You mentioned about erosion. Is there any office in particular that we can talk to because we have a major problem in our property. And we have been talking to Stanford, all the agencies, and nothing gets done. We have lost a very -- part of our property. So we want to bring this to the City and the agencies to see how can we work together to resolve our issues.

MR. MATERMAN: I remember several years ago we took a tour of the creek bank at Allied Arts and there was an issue then. This was seven or eight years ago.

It's not part of this project at the moment.

I would recommend you submit a comment about that and that you contact us and we'll take a look at specific issues at the creek bank on your property.

PH3-29 Con't

There are areas that we're going to do restoration work as part of this project to mitigate for some environmental impacts of working in the creek channel. And it's possible that Allied Arts property is a good candidate for that. And so we should be in touch about that and we can look at that.

Yes, ma'am?

PH3-30

AUDIENCE MEMBER: Who would we address the safety of what's going on? We have a lot of children that live on Woodland now. And some are biking on Woodland to go over to the schools in Menlo Park. Some are coming around to the junior high school and -- it's not junior, but fourth through sixth on Emma Lane. My grandchildren are there. I'm concerned about safety or safety at the building site.

Is there any temporary fencing they would put up? Or protect what they're doing?

And also it is not attractive.

MR. MATERMAN: Let me ask Alec to respond to that.

AUDIENCE MEMBER: Unattractive.

MR. MATERMAN: Let me ask Alec to respond to that.

During construction, what are the measures they will take?

MR. NICHOLAS: At Pope-Chaucer Bridge?

PH3-30 Con't

AUDIENCE MEMBER: Yes.

MR. MATERMAN: Yeah, there would be temporary fencing put around the construction site so nobody would access that site.

AUDIENCE MEMBER: Unless you climbed over it.

MR. NICHOLAS: Correct, yes.

MR. MATERMAN: Okay. Are there other verbal comments?

Yes, Michel?

PH3-31

MS. JEREMIAS: I think there was a suggestion to put a temporary bridge in. There will be neighbor people and kids who climb down to go cut across and they're going to cut a swath into the vegetation that we do have there.

It's just going to happen if it's not passible for a long time.

PH3-32

AUDIENCE MEMBER: Plus are you aware Woodland is put as a bike lane? Like a bike path. So it's already inviting bikes to come ride on Woodland.

AUDIENCE MEMBER: That's changed since the

PH3-32
Con't

Draft EIR was commissioned.

MR. MATERMAN: Yes, Michel?

MS. JEREMIAS: Ma'am, before you leave --

Excuse me, ma'am, before you leave, I wanted to get your attention for a second.

Len, can you go back to the slide where you talked about flows? I want to remind everybody --

MR. MATERMAN: The floodplain map?

MS. JEREMIAS: Yeah. Yes, please.

So as you all remember, you were all here when Judge Reise (phonetic), my predecessor, was here. One of the projects he worked on and you guys voted for was the San Francisquito Pump Station. It was completed in 2007.

I want to remind you guys when you provide your comments to incorporate that.

These maps that we've been looking at reference the flooding of 1998. The pump station wasn't built. We weren't able to pull all the water and discharge it out to the Creek.

The construction of the San Francisquito Creek Pump Station probably would eliminate or alleviate some of the flooding that you normally would see. And that's your concern. So maybe that would address the issue.

We don't know. We haven't had that flood since we had the pump station.

PH3-32
Con't

We also just completed construction of the Matadero Creek Pump Station. It's similar in size. There's been a number of projects that have taken place that will reduce some of the street flooding.

I don't want to deter from this project, but I want you guys to remember that we've had other projects in the City of Palo Alto that will reduce flooding.

MR. MATERMAN: Thank you, Michel.

Okay. Any other final comments?

If not, please stick around and talk to one of us that are working here on the project.

And thank you very much again for coming and please submit any comments you have by June 19.

(Applause.)

(Proceedings concluded.)

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REPORTER'S CERTIFICATE

I, Connie J. Parchman, CSR #6137, do hereby certify that I am an official court reporter; that I was the certified shorthand reporter in the above-mentioned case; that I took down in shorthand the proceedings and thereafter transcribed said notes into longhand; and that the forgoing pages upon which my name appears at the bottom, constitute a full, true and correct transcript of the said notes in said proceedings.

Connie Parchman

Connie J. Parchman, CSR #6137

Dated: June 13, 2019
DUBLIN, CA

Table F-2. Individual Comments and Responses on the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project Upstream of Highway 101 Draft EIR

Letter	Comment #	Commenter	Final EIR Page #	Summary of Comment	Response to Comment
A1	1	NMFS	N/A	The comment provides introductory statements and a summary of the preferred project.	This comment does not raise a specific issue on the substance of the Draft EIR.
A1	2	NMFS	N/A	The comment provides general statements regarding a population of Central California Coast steelhead that occur in the San Francisquito Creek and critical habitat within the Creek.	This comment does not raise a specific issue on the substance of the Draft EIR.
A1	3	NMFS	N/A	The comment acknowledges that the Draft EIR provides details regarding the construction techniques and materials that would be used for the Preferred Alternative. However, the comment points out that there should be more detail concerning aquatic habitat restoration, specifically involving the Central California Coast steelhead.	The details of the aquatic habitat restoration features will be developed during detailed design, The SFCJPA will continue to seek the input of NMFS and other regulatory agencies on the designs and locations of step pools, woody debris, and other fish passage structures.
A1	4	NMFS	3.3-92 – 3.3-94	The comment states that the Draft EIR analyzes the potential effects of increased high-volume events related to flooding, but does not analyze changes on fish migration.	We have augmented the discussion of changes in velocity and effects on fish migration on pages 3.3-92 and 3.3-94 of the Final EIR.
A1	5	NMFS	N/A	The comment states that the NMFS would like a defined process to provide comments on project design elements, such as habitat enhancement features.	The details of the aquatic habitat restoration design features will be developed during detailed design in consultation with NMFS and CDFW, and resulting designs will be provided to NMFS and CDFW for review and comment.
A1	6	NMFS	3.3-92 – 3.3-94	The comment states the Draft EIR does not provide sufficient information to conclude that there would be less than significant impacts with mitigation on steelhead trout and suitable habitat considering that there would be construction activities that have the potential to result in	We have augmented the discussion of changes in velocity and effects on fish migration on pages 3.3-92 and 3.3-94 of the Final EIR.

Letter	Comment #	Commenter	Final EIR Page #	Summary of Comment	Response to Comment
				permanent impacts to fish migration associated with changes to channel velocities.	
A1	7	NMFS	N/A	The commenter notes that additional information regarding the alternatives that were removed from further consideration would be helpful.	The description of alternatives to the proposed project included in Chapter 2, *Program Description*, of the EIR was prepared per CEQA Guidelines Section 15126.6, an "EIR should briefly describe the rationale for selecting the alternatives to be discussed. The EIR should also identify any alternatives that were considered by the lead agency, but were rejected as infeasible during the scoping process and briefly explain the reasons underlying the lead agency's determination." As the SFCJPA has provided sufficient information to consider and reject these alternatives from further consideration, no further information is warranted
A1	8	NMFS	3.3-2 – 3.3.3	The comment states that a description of the NMFS Coastal Multispecies Recovery Plan for Central California Coast steelhead, as well as considerations of recovery actions should be included in the regulatory setting of biological resources.	A description of the California Coastal Multispecies Recovery Plan has been added to pages 3.3-2 and 3.3-3 of the Final EIR, with listed recovery actions for San Francisquito Creek.
A2	1	City of East Palo Alto	N/A	The comment notes that it is important that the replacement of the Pope-Chaucer Bridge and Newell Bridge are coordinated to ensure the completion of the Newell Bridge before the Pope-Chaucer Bridge.	The SFCJPA will coordinate with the City of Palo Alto to ensure that the Newell Road Bridge Replacement Project is completed prior to replacement of Pope-Chaucer Bridge.
A2	2	City of East Palo Alto	Figure 2-1 / 2-15; Figure 2-6 / 2-22	The comment states the preliminary design work is being completed by NV5 in advance of completion of the Final EIR and questions whether this is appropriate.	As noted in the comment, design of the Pope-Chaucer Bridge has continued past release of the Draft EIR. Some of this additional design has resulted in a refinement to the construction footprint, which is reflected in the Final EIR, including on Figure 2-1, page 2-15, and Figure 2-6, page 2-22. It is common in the case of infrastructure projects for full project design to be completed after publication of a Draft EIR. As is typical of CEQA documents that are prepared ahead of 100 percent project design, the EIR's analysis of impacts associated with Pope-

Letter	Comment #	Commenter	Final EIR Page #	Summary of Comment	Response to Comment
					Chaucer Bridge is based on what was known when the Draft EIR was released for public review, and the EIR makes conservative assumptions as to the project's impacts. In other words, wherever assumptions are required to accommodate for an absence of project design detail, the EIR generally assumes that the most impactful option would be implemented. Refinement of the bridge design is not anticipated to result in environmental impacts above those which were identified in the Draft EIR.
A2	3	City of East Palo Alto	N/A	The comment states that the project construction schedule seems unrealistic.	The Draft EIR states that the SFCJPA is working to enable construction to begin in 2020, but that given the complexities and uncertainties associated with permitting and funding this project, construction may not begin until 2021. At this time, 2021 is the likely start date. The SFCJPA always pursues an aggressive schedule due to continued flood risk and the length of time it takes to begin construction of complex projects in environmentally sensitive areas.
A2	4	City of East Palo Alto	N/A	The comment states that the process for property acquisition and right-of-way easements should be included in the document and questions whether the upstream detention basin alternatives are feasible in consideration of these processes.	Property acquisition and easements may be necessary to achieve project objectives, once the project is approved. However, CEQA does not require that these be included in the EIR.
A2	5	City of East Palo Alto	N/A	The comment asks that a statement be included in the Final EIR that indicates the construction equipment and methods listed in Section 2.8, *Description of Alternatives*, are typical for this type of project.	This is not required by CEQA.
A2	6	City of East Palo Alto	N/A	The comment states that the breakdown of construction activities and reasoning for schedule basis be included in the Final EIR.	This is not required by CEQA.
A2	7	City of East Palo Alto	2-10 – 2-11	The comment asks if impacts to the University Avenue Bridge have been analyzed as a result of Alternative 11, *Remove the Pope-Chaucer*	As described in Chapter 2, *Program Description*, of the Draft EIR (Table 2-1), Alternative 11, *Remove the Pope-Chaucer Bridge and Increase Capacity*

Letter	Comment #	Commenter	Final EIR Page #	Summary of Comment	Response to Comment
				Bridge and Increase Capacity Downstream. Specifically, the comment asks what the current flow capacity of the University Avenue bridge is, and whether or not the flood risk would be shifted downstream to University Avenue as a result of Alternative 11.	*Downstream*, was screened out because it did not meet the project objective, and no additional analysis was conducted.
A2	8	City of East Palo Alto	N/A	The comment asks if there would be impacts on existing utilities on University Avenue due to proposed slope stabilization methods.	While the exact location of all existing utility infrastructure located on University Avenue is not identified in the EIR, Impact UT-1 in Section 3.14, *Utilities*, describes the utility relocation that would be required during project construction. The information provided in the EIR is sufficient to determine whether project construction would result in adverse effects on utilities, including the potential for service interruption. Utility infrastructure, as well as details on relocation, if any, will be mapped as part of final design.
A2	9	City of East Palo Alto	Figure 2-1 / 2-13	The comment states that the red-highlighted staging area in Figure 2-1, *Channel Widening Alternative Components*, might not be feasible.	Initial construction feasibility has been examined by project engineers and a former construction contractor. All project partners will have opportunity to review the contractor's means and methods prior to construction.
A2	10	City of East Palo Alto	N/A	The comment asks who would be responsible for operation and maintenance of floodwalls.	An Operations and Maintenance Manual will be developed for the project, as well as a Maintenance Agreement delegating maintenance responsibility for the project features. This is subject to future negotiations among the SFCJPA member agencies.
A2	11	City of East Palo Alto	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment asks if an assessment of impacts to City trees as a result of project construction has been prepared, and if there are any proposed mitigation measures.	Impacts to trees are discussed in Section 3.3, *Biological Resources*, pages 3.3-78 to 3.3-82, which also includes mitigation measures to protect and replace trees. The EIR concludes that with implementation of MM-BIO-12, which would compensate for the loss off trees consistent with applicable tree protection ordinances, and MM-BIO-13, which would protect trees from construction impacts, impacts on protected trees would be less than significant. Additional information regarding trees

Letter	Comment #	Commenter	Final EIR Page #	Summary of Comment	Response to Comment
					that may be removed during construction has been added to the Final EIR in Table 3.3-7 and Figures 1 to 3 in Appendix B, showing potential tree removal locations.
A2	12	City of East Palo Alto	2-31; 3.13-8	The commenter reiterates some of the information provided on page 2-31 of the Draft EIR, regarding traffic management, and notes that a complete traffic control plan will be required for review/approval by the City of East Palo Alto prior to project construction.	As discussed on page 3.13-8 of the EIR, implementation of MM-TT-2 would require preparation of a site-specific traffic control plan. As stated in the text of MM-TT-2, the plan will be subject to review and approval by the City of East Palo Alto. MM-TT-2 also provides a list of the general requirements for what the plan should contain.
A2	13	City of East Palo Alto	2-34; Figure 2-3 / 2-19; Figure 2-4 / 2-20	The commenter notes that the project could include construction of two small Creekside parks in the City of East Palo Alto, and that the design of the parks should be coordinated with the City's Public Works Department.	As discussed in Chapter 2, *Program Description*, of the EIR, both the Channel Widening and Floodwalls Alternatives could include construction of Creekside parks, page 2-34. As noted by the commenter, the locations of the potential parks is shown in Figures 2-3 and 2-4 of the EIR. Design, operation, and maintenance of these parks would be coordinated with the City of East Palo Alto.
A2	14	City of East Palo Alto	Figure 2-7 / 2-30; Figure 2-9 / 2-36; Images 3.1-1, 3.1-2 / 3.1-20	The commenter notes that it would be helpful to have photos and/or visual simulations included in the Draft EIR.	A typical illustration of a soil nail wall is provided in Figure 2-7 on page 2-30 of the Final EIR, an photo of a typical sheet pile floodwall is provided in Figure 2-9 on page 2-36 of the Final EIR, and Visual simulations of the new bridge are depicted in Images 3.1-1 and 3.1-2 on page 3.1-20 of the Final EIR. Visual simulations and examples of proposed project elements beyond what is shown on pages 2-30, 2-36, and 3.1-20 will be developed and shared with the public as project design and permitting are advanced.
A2	15	City of East Palo Alto	3.1-16 – 3.1-24; 3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The commenter notes that additional information, including a diagram, should be provided regarding which trees will be impacted by the project. The commenter further notes that the loss of trees should be discussed as visual impacts.	Additional information regarding trees that may be removed during construction has been added to the Final EIR in Table 3.3-7, pages 3.3-78 to 3.3-82, and Figures 1 to 3 in Appendix B, showing potential tree removal locations. The discussion in Section 3.3, *Biological Resources*, under Impact Bio-5, includes an analysis of the disturbance or loss of locally protected trees. More specifically, Table 3.3-7

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					provides an accounting of tree impacts by site and City. Tree impacts are also described in greater detail in the arborist report prepared for the project, which is includes in Appendix B of the Draft EIR. The EIR concludes that with implementation of MM-BIO-12, which would compensate for the loss off trees consistent with applicable tree protection ordinances, and MM-BIO-13, which would protect trees from construction impacts, impacts on protected trees would be less than significant. Impacts to trees are also discussed in Section 3.1, *Aesthetics*, which states that upon project completion, street trees and other vegetation, including at the bottom and tops of banks, would be replanted with native species. The EIR notes that although shrubs and groundcovers would grow rather quickly, it will take several years before planted trees would be mature enough to provide the same type of aesthetic character as some of the trees that would be removed, which may be perceived negatively. However, the proposed landscaping plan would focus on a native planting palette and would provide greater habitat value, as well as a more varying visual variety, than current conditions, which may be perceived as beneficial. Ultimately, the EIR concludes that while construction activities represent observable changes to visual character, these changes would be temporary, and revegetation efforts would restore, and could even restore, the visual character of the project site. Therefore, aesthetic impacts related to tree removal during project construction would be less than significant.
A2	16	City of East Palo Alto	3.1-17; 3.3-21 – 3.3-22	The commenter asks how a widened creek and removal of vegetation is consistent with existing visual character. The commenter also asks how the widened creek at Site 5 compares with the existing creek width.	A described on page 3.1-17 of Section 3.1, *Aesthetics*, views for most viewers would mostly be unchanged by the presence of instream staging and construction and associated vegetation removal, due to the density of the existing bankside vegetation and tree canopy, as well as the relatively limited vegetation removal that

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					is proposed. For views within the creek area and for those views with direct sightlines to the creek, the instream staging and construction would create a temporary visual disturbance, and the vegetation removal would open up views to provide a more expansive landscape of the habitat areas that compose the creek bed and its surrounding areas. This is not to say that there would be no observable visual changes in the vicinity of the project site; however, given that vegetation would be reestablished over time, construction activities would not contribute to a substantial degradation of the visual character or quality of the project site and its surroundings. Furthermore, as described on pages 3.1-21 and -22, structural components within the widened areas would replace existing structures and would not require large-scale vegetation removal. Finally, activities such as debris and invasive plant removal, vegetation inspection, and replanting (as necessary) would serve to enhance the overall visual character and quality of the project site. Therefore, neither construction nor operation of the proposed project would contribute to a substantial degradation of the visual character or quality of the project site and its surroundings. Specifically at site 5, the creek will be widened to conform with the expanded Highway 101 structure and bank upstream. At the location of greatest widening, adjacent to the West Bayshore Bridge, Site 5 top of bank will be widened from approximately 90 feet (existing width) to approximately 120 feet. Top of bank widening tapers back to conform with existing top of bank approximately 80 feet upstream of West Bayshore Road, and slope widening conforms to the existing slope approximately 440 feet upstream of West Bayshore Road.
A2	17	City of East Palo Alto	3.1-17	The commenter notes that the introduction of construction equipment and workers would alter	As noted by the commenter, and discussed in the Draft EIR, contractors would use best management

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				the existing visual environment and states that the project shall include provisions for the reconstruction of Woodland Avenue and other City streets to mitigate impacts.	practices to reduce or avoid visual impacts during construction. As described on page 3.1-17, tree pruning would occur during construction on Woodland Avenue. However, although pruning would partially remove branches and/or reduce tree cover throughout the project areas, pruning activities would be limited, and therefore, visual changes associated with tree pruning activities are expected to be negligible. Once construction is complete, other changes to the visual character in the vicinity of Woodland Avenue, such as those associated with the presence of construction equipment and activities as earthwork, excavation, associated truck hauling, and other major material and equipment movement and storage, would be restored to pre-project conditions.
A2	18	City of East Palo Alto	2-45; 3.10-13; 3.3-86 to 3.3-90; 3.3-101 to 3.3-105; 3.3-111 – 3.3-112	The comment asks that nighttime construction hours be included in the document. The comment also asks questions concerning nighttime construction noise impacts on residents and nighttime construction lighting impacts on residents and wildlife in the creek.	As stated on page 2-45 of Chapter 2, *Program Description*, of the EIR, construction is expected to occur during normal working hours, within working hours required by the Cities of Palo Alto, East Palo Alto, and Menlo Park. This would minimize the impacts of light on animals in the creek and limit the effects of lighting on adjacent residences. Built elements (i.e., lampposts) associated with the replacement of the Pope-Chaucer Bridge would not significantly alter ambient illumination light levels or result in significant spill light impacts on surrounding land uses. No built elements associated with the Channel Widenings at Sites 1 to 5 and aquatic habitat enhancement sites would introduce new sources of light that could increase ambient illumination light levels or result in significant spill light impacts on surrounding land uses. Parks would not be lit at night, and, therefore, would not introduce any new sources of light that could increase ambient illumination light levels or result in significant spill light impacts on surrounding land uses. Furthermore, MM-AES.1, Control Nighttime Lighting, requires that SFCJPA

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					ensure that if nighttime lighting at the construction site is required, lighting will be directed downward/on site, away from sensitive receptors (i.e., residences), and spillover light will be minimized to the greatest extent practicable. With respect to nighttime noise, as described on page 3.10-13 of the EIR, it is likely that, to complete necessary aspects of the project, some construction activity may be required outside of the construction noise exemption hours, which is after 8 p.m. in East Palo Alto. In this circumstance the City of East Palo Alto's exterior noise level standards apply. The most stringent of these standards are 75 dBA from 7 a.m. to 10 p.m. and 70 dBA from 10 p.m. to 7 a.m., as measured at a noise-sensitive land use. Given the noise levels associated with construction, it is highly probable that nighttime construction activity would exceed East Palo Alto's noise standards. MM-NV-1, MM-NV-2, and MM-NV-3 would be required to attempt to further reduce noise. These mitigation measures would provide advance notice to nearby residences, designate a disturbance coordinator to handle resident complaints, and install noise barriers to further attenuate noise. Even with implementation of these measures, it is unlikely that all construction activities would be able to comply with the noise ordinance limits in the City of East Palo Alto. Consequently, this impact is significant and unavoidable. Noise impacts on wildlife are addressed in Section 3.3, *Biological Resources*, specifically with respect to salmonids (Impact BIO-6, page 3.3-86 to 3.3-90), bats (Impact BIO-9, pages 3.3-101 to 3.3-102), nesting migratory birds and raptors (Impact BIO-10, pages 3.3-102 to 3.3-105), and western burrowing owls (Impact BIO-15, page 3.3-111 to 3.3-112).

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					Should nighttime construction activities be necessary, the SFCJPA will obtain all appropriate approvals and conduct notifications as required.
A2	19	City of East Palo Alto	3.14-7	The comment asks if there is a site plan included in the Draft EIR that shows the existing and proposed locations of utilities that are proposed to be relocated.	The discussion on page 3.14-7 in Section 3.14, *Utilities*, Impact UT-1 discusses some known utilities that would need to be relocated, specifically a transmission box at Access Ramp 2. However, the exact location of all existing and proposed utility boxes, poles, and other minor appurtenances is not fully known at this time. These features will be identified and mapped prior to completion of final design and construction.
A2	20	City of East Palo Alto	3.3-78 – 3.3-82	The comment asks which jurisdiction would be responsible for tree removal permits as a result of the proposed project and how nearby property owners or occupants will be notified of tree removals.	Tree removal permits will be requested by SFCJPA within each jurisdiction, according to the applicable tree ordinance or other local regulatory requirements related to tree removal and replanting. As required by Title 18 of the East Palo Alto Development Code, property owners and tenants abutting a tree proposed for removal will be notified twice: first, upon submittal of the permit and, if approved, a second time at least 48 hours prior to removal. The notification will be in a written form that demonstrates proof of delivery to abutting owners and tenants. Construction related impacts to trees would be further minimized through implementation of MM-BIO-12 and MM-BIO-13, which compensate for the loss of trees, consistent with applicable tree protection regulations, and protect trees from construction impacts.
A2	21	City of East Palo Alto	3.2-12	The comment asks why impacts related to air quality and construction equipment are analyzed qualitatively for the Former Nursery Detention Basin and Webb Ranch Detention Basin Alternatives, rather than quantitatively. The comment also provides support for MM AQ-1, MM AQ-2, and operation and maintenance	As discussed on page 3.2-12 of the Draft EIR, data was not available to quantitatively model criteria pollutant and greenhouse gas emissions during the potential construction of the Former Nursery Detention Basin and Webb Ranch Detention Basin Alternatives. Health risks for each alternative were qualitatively evaluated due to the relatively short

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				activities that adhere to usage of zero emission equipment or lower greenhouse gas emission equipment.	construction durations for each alternative, compared to the 30-year exposure period typically associated with chronic cancer health risks. In addition, construction would occur in a generally linear fashion at each of the project sites for the Channel Widening and Floodwalls Alternatives, limiting the exposure of any individual sensitive receptor located near one of the project site to construction-related DPM and $PM_{2.5}$ exhaust emissions.
A2	22	City of East Palo Alto	3.3-73 – 3.3-84	The comment notes that impacts to biological resources as a result of removal of riparian habitat, trees, and stream alteration needs to be included in the Final EIR.	Impacts to riparian habitat and aquatic resources (including stream alteration) are fully addressed in Impact BIO-3, pages 3.3-73 to 3.3-74, and Impact BIO-4, pages 3.3-74 to 3.3-77. Impacts to trees are discussed in Impact BIO-5, pages 3.3-77 to 3.3-84. Figures 1 to 3 have also been added to Appendix B of the Final EIR showing potential tree removal locations.
A2	23	City of East Palo Alto	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment requests information regarding impacts to trees and compensation for impacts to trees. The comment also requests that an arborist be involved as part of the design team, that tree protection plans be submitted prior to project approval, questions whether the Project Arborist is a third-party contractor, and notes that permits are required for heritage tree removal requests.	The SFCJPA has developed the preliminary design for the proposed project to avoid and minimize environmental impacts, including impacts to trees. Additional information regarding trees that may be removed during construction has been added to the Final EIR in Table 3.3-7, pages 3.3-78 to 3.3-82, and Figures 1 to 3 in Appendix B, showing potential tree removal locations. Tree pruning may occur throughout the project area; however there are no specific maps depicting specifically where this pruning would occur as the level of design to identify exactly where pruning may occur is not yet available. Under Impact BIO-5, *Result in disturbance or loss of locally protected trees*, MM-BIO-12 discusses compensation for tree removal. Compensation as part of MM-BIO-12 would only apply for trees removed as part of the project and would not include compensation for construction impacts adjacent trees as requested in the comment.

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					MM-BIO-13 presented in this same impact discussion requires that a licensed arborist (Project Arborist) prepare a tree protection plan, discuss impacts on trees with construction crews, and monitor excavation of sacked concrete and drilling for soil nails to determine if trees will be impacted during construction and other related activities to address construction-period impacts. The Project Arborist would be a third-party contractor who will be hired by either the SFCJPA or the construction contractor, and would report to the SFCJPA. The SFCJPA will consider involving the Project Arborist during final design. The tree protection plan referenced in MM-BIO-13 will depend, in part, on details in the final design, which are not yet available. Therefore the timing proposed for preparation of the tree protection plan prior to construction (but not prior to approval of the project by the SFCJPA Board of Directors) is appropriate. The comment regarding permits for heritage tree removal requests is noted and is implied through reference to the City of East Palo Alto's Development Code Section 18.28.40 on Draft EIR page 3.3-77. Section 18.28.40 contains the City of East Palo Alto's tree regulations.
A2	24	City of East Palo Alto	3.6-5	The comment states the City of East Palo Alto utilizes GHG emission information provided in the Climate Action Plan and that there are implementation strategies to enhance the carbon neutral community.	As discussed on pages 3.6-5 of the Draft EIR, the City of East Palo Alto's CAP provides a greenhouse gas emissions inventory for 2005, an emissions forecast for 2020, and a reduction goal for 2020, while also proposing 23 local emissions reduction strategies to help meet AB 32 reduction targets. However, the CAP does not satisfy the tiering requirements of CEQA Section 15183.5 of the State CEQA Guidelines and is not used to determine the significance of project-related GHG emissions.
A2	25	City of East Palo Alto	3.6-12	The comment states that the California Green Building Code (effective 1/1/2017) requires 65	The California Green Building Standards Code applies to residential and nonresidential buildings. Section 301.3 defines the scope with respect to

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				percent of construction and demolition debris to be diverted, not 50 percent.	nonresidential additions and alterations, and states, “The provisions of individual sections of Chapter 5 [Nonresidential Mandatory Measures] apply to newly constructed buildings, building additions of 1,000 square feet or greater, and/or building alterations with a permit valuation of $200,000 or above (for occupancies within the authority of California Building Standards Commission).” As the project is not a residential building and is not within the scope of nonresidential buildings to which the Code applies, the project would not be subject to the Code and would not be required to divert 65 percent of construction and demolition debris.
A2	26	City of East Palo Alto	3.7-9 – 3.9-10	The comment states that transporting, disposal, or use of any hazardous materials, requires a special transportation permit from the City of East Palo Alto.	As stated on page 3.7-9 and 3.9-10 of Section 3.7, hazardous and potentially hazardous materials used in project construction or operation would be transported, stored, and handled in a manner consistent with all relevant regulations and guidelines, including those recommended and enforced by the U.S. Department of Transportation, Santa Clara County Department of Environmental Health, and San Mateo County Environmental Health Department. MM-HAZ-1 requires the preparation and implementation of a Spill Prevention, Control, and Countermeasure Plan, and MM-HAZ-2 requires that the storage and handling of potential pollutants and hazardous materials be in accordance with all local, state, and federal laws. These measures would include provisions for appropriate handling of any hazardous materials used on the project site, as well as a Spill Prevention, Control, and Countermeasure Plan to minimize the potential for, and effects of, inadvertent spills occurring during project construction. The SFCJPA will be responsible for ensuring that all BMPs for hazardous materials handling and use are properly implemented. SFCJPA will also obtain any required permits from each jurisdiction in which the

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					project would occur, including a special transportation permit from East Palo Alto, if applicable.
A2	27	City of East Palo Alto	3.13-8 – 3.13-9	The comment notes that provisions need to be included in the document to keep Woodland Avenue open to emergency vehicles at all times, as well as in the case of emergency evacuation.	As discussed on pages 3.13-8 and 3.13-9 of Section 3.13, *Transportation*, of the Draft EIR, implementation of MM-TT-2, which requires a site-specific traffic control plan, would be required for the project to reduce impacts related to traffic safety to a less-than-significant level. The traffic control plan will include, at a minimum, information regarding working hours, allowable and restricted streets, allowable times for lane closures, emergency vehicle access, detours, and access to private and public properties. This would include plans for the use of Woodland Avenue during project construction.
A2	28	City of East Palo Alto	2-24; Appendix D	The comment asks for a description of how the channel and bridge approach at University Avenue will be able to manage increased water flow, as well as for a thorough explanation of downstream impacts. The comment requests that a copy of the hydrology study be provided prior to design of the flood walls.	HEC-RAS modeling shows that the channel upstream of University Avenue can contain flows and the bridge can pass flows under pressure flow following installation of the project elements. Replacement of the temporary wooden structure extending the University Avenue Bridge parapet upstream of that bridge along Woodland Avenue is a key feature in facilitating the additional flow. As described on page 2-24, the permanent replacement of the University Avenue Bridge parapet would be up to 3 feet in height. The HEC-RAS modeling was conducted as part of the San Francisquito Creek Hydrology Study, which is included as Appendix D to the EIR.
A2	29	City of East Palo Alto	3.3-78 – 3.3-82	The comment questions if the tree replacement plan would comply with the City of East Palo Alto's Heritage Tree Ordinance.	See response to comment A2-20, above.
A2	30	City of East Palo Alto	3.10-13 – 3.10-14	The comment states that construction activities associated with pile drivers exceed the noise ordinance. The comment also notes that more clarification and review of powered equipment is needed for daytime construction activities.	During daytime hours, construction noise is exempt from the noise ordinance limits in the cities of East Palo Alto and Menlo Park. However, it is stated on page 3.10-13 of the Draft EIR that "it is likely that, to complete necessary aspects of the project, construction activity may be required outside of the exemption hours…". Because construction would

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					occur outside of the exemption hours, page 3.10-14 of the Draft EIR evaluates construction noise levels with respect to the noise ordinance limits in East Palo Alto, Menlo Park, and Palo Alto. MMs NV-1 through NV-3 are proposed to reduce noise, but the conclusion of the Draft EIR on page 3.10-14 is that the project would not comply with the noise ordinance limits and is thus significant even with mitigation.
A2	31	City of East Palo Alto	2-45; 3.10-14 – 3.10-15	The comment asks about the details of MM NV-1, including whether vibration attenuation methods can be included rather than waiting for a complaint, how frequently monitoring will occur, and whether there is a way to reduce noise from back-up alarms, and requests that the term “residences” be replaced with “property owners and occupants.” The comment also requests clarification on who determines whether construction hours are extended, and on the location of temporary noise barriers and potential secondary impacts.	It should be noted that MM-NV-1 is proposed to mitigate construction noise, while MM-NV-4 mitigates construction vibration. As discussed in Chapter 2 and listed on page 3.10-14 of the Draft EIR, the project design incorporates a number of noise control practices. These practices would begin when construction begins. MM-NV-1 would then serve to mitigate any remaining noise by addressing individual complaints; however, the EIR found that noise impacts could not be mitigated to a less than significant level. Vibration impacts would be mitigated by MM-NV-4 through vibration monitoring and a requirement that construction activities immediately cease if they result in levels of vibration exceeding established thresholds for building damage. Regarding backup beeping noises from trucks, an additional noise control measure has been added on page 2-45 of the Final EIR to minimize noise from this source. This measure, like the other noise control measures, is part of the project design and not a mitigation measure. The text of MM-NV-1 already uses “property owners and occupants,” which is consistent with the recommendation of the commenter. Additionally, MM-NV-1 in the Draft EIR specifies that advanced notice will be provided to property owners and occupants, consistent with the commenter’s recommendation. Regarding the extension of construction hours, as indicated on page 3.10-15 of the Draft EIR, the

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					construction contractor and SFCJPA would make the determination to extend construction hours. Notifying residents in advance of extended construction hours may not be feasible, as the decision to extend hours may depend on specific conditions that cannot be known with certainty in advance. Regarding the temporary noise barriers, such barriers would surround the work area, as discussed on page 3.10-15 of the Draft EIR. The exact location will vary based on site-specific conditions, but, per MM NV-3, the barriers will need to be placed to block the line of sight between the equipment and any residences to most effectively attenuate noise. Regarding the potential for the barriers to cause secondary impacts, as described in MM NV-3, the barriers would be installed to avoid impacts on trees, habitat, and line of sight safety issues, as part of the measure's minimum criteria. Regarding the effectiveness of plywood barriers, the Draft EIR concludes on page 3.10-14 that construction noise would be significant and unavoidable, because MM-NV-1 through MM-NV-3 would not sufficiently reduce noise levels to comply with the noise ordinance limits.
A2	32	City of East Palo Alto	3.12-16	The comment notes that the two proposed parks (400 square feet in size) do not meet the City of East Palo Alto's definition of a small park, and that further clarification of the park size is needed.	The description of the approximately 400 square feet parks the project may develop, at the request of the City of East Palo Alto, is accurate. The reference to the parks as "small" parks is intended as a general descriptor, not an official designation.
A2	33	City of East Palo Alto	3.13-6; 3.13-8	The comment states the traffic delays associated with construction activities are unacceptable, and that a special transportation permit is required for all truck trips transporting materials on the streets of East Palo Alto. The comment also questions if a traffic analysis was conducted at the intersection of Woodland Avenue and University Circle.	As described on page 3.13-6 of the Draft EIR, delays of up to 30 minutes at access ramps may occur; however, this was determined to be a less-than-significant impact under CEQA because alternate routes are available to avoid these delays. The note regarding the need for a special permit for truck trips is acknowledged; such a permit will be obtained by the SFCJPA or construction contractor prior to the

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					start of construction. With respect to the question of the traffic analysis at the signalized intersection of Woodland Avenue and University Circle (assumed to be University Avenue), a level of service analysis was conducted for this intersection and is presented on page 17 of Appendix E, *Traffic Analysis*.
A2	34	City of East Palo Alto	3.13-10	The comment notes that provisions need to be included in the document to keep Woodland Avenue open to emergency vehicles at all times, as well as in the case of emergency evacuation.	The two mitigation measures presented in Impact TT-4 would be effective at maintaining emergency vehicle access by regulating and maintaining the flow of traffic through the use of detours and the placement of a temporary signal at the Middlefield Road/Woodland Avenue intersection, the use of restricted construction traffic areas as specified in the traffic control plan, consultation with emergency service providers in advance of roadway closures, and ensuring clear emergency access to all existing buildings and facilities at all times.
A2	35	City of East Palo Alto	3.14-1	The comment states that there are existing utilities along Woodland Avenue that need to be considered for selection of the proper slope stabilization method during the design phase of the project.	The SFCJPA acknowledges the existence of multiple existing utilities along Woodland Avenue. The exact location of existing utilities will be identified and mapped prior to completion of final design to avoid conflicts with existing utility infrastructure.
A2	36	City of East Palo Alto	4.1-1	The comment states notes that there seems to be a contradiction between the conclusions reached in Air Quality Impacts discussion, which concludes that impacts are less than significant with mitigation, and the Cumulative Air Quality Impacts discussion, which states that there are temporary significant and unavoidable emissions impacts during project construction.	The discussion in Section 4.1.1, *Air Quality*, of the Draft EIR incorrectly stated that the project's construction emissions would exceed the Bay Area Air Quality Management District's (BAAQMD) daily emission thresholds, even with the implementation of MM-AQ-1 and MM-AQ-2. Page 4.1-1 has been revised in the Final EIR to be consistent with impact discussions in Section 3.2, *Air Quality*, which conclude that the project's mitigated construction emissions would not exceed the BAAQMD's health risk thresholds. The text in the Final EIR also acknowledges that the proposed project's construction activities would result in cumulative health risk impacts due to exceedances of BAAQMD's

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					cumulative health risk thresholds, which is consistent with the finding in Section 3.2, *Air Quality*.
A2	37	City of East Palo Alto	3.1-24	The comment states that there is concern over visual impacts caused by the height of flood walls along Woodland Avenue.	As described on page 3.1-24 of the Draft EIR, the floodwalls associated with the Floodwalls Alternative would not exceed 2 feet from the top of the bank. While this would be a new feature visible above the creek bank and introduced into areas that have viewers with higher sensitivity (residents), the visual changes would be minimal, considering the amount of current bank armoring, the size of the proposed floodwalls (relative to the existing channel height), and because the dense vegetation and trees would mostly screen available views to this feature. Any areas cleared of vegetation and/or trees during construction would be revegetated and replanted, as necessary. As such, this alternative is not anticipated to substantially degrade the visual character or quality of the project site and its surroundings.
A3	1	California Department of Fish and Wildlife	N/A	The comment provides introductory statements, a summary of proposed project, and the California Department of Fish and Wildlife's role as a responsible agency.	This comment does not raise a specific issue on the substance of the Draft EIR.
A3	2	California Department of Fish and Wildlife	2-17; 2-23 – 2-24; 3.14-8 – 3.14-9	The comment suggests that the Draft EIR include an analysis of the cut and fill balance for each of the proposed alternatives. In addition, the analysis should include the locations of disposal sites and impacts of sediment disposal for the alternatives that are expected to create a surplus of excavated sediment.	An estimate of the amount of materials to be removed by each alternative is described in Section 2.8 of the Draft EIR. Specifically, material removal relating to the Pope-Chaucer bridge replacement is provided on page 2-17, and material relating to channel widening at sites 1 through 5 is provided on pages 2-23 and 2-24. As described in Impact UT-2 on pages 3.14-8 and 3.14-9, these materials would be transferred from the Sunnyvale Materials Recovery and Transfer Station to either Kirby Canyon Landfill, Monterey Peninsula Landfill, or Ox Mountain Landfill for disposal.
A3	3	California Department of Fish and Wildlife	3.3-11 – 3.3-57	The comment notes that the EIR should include all construction activities associated with the replacement of the Pope-Chaucer Bridge, or other activities, that would occur in the spring.	Section 3.3.2, *Environmental Setting*, of the EIR describes existing biological communities, species (including listing status), and habitats within the study area (pages 3.3-11 to 3.3-57). Impacts on these

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				Additionally, the comment states that the Draft EIR should include information describing all existing habitat types within the project site, including species composition and temporal span of the impacts.	species and habitats that they occupy are provided in the impact discussions that follow in Section 3.3, *Biological Resources*, beginning on page 3.3-58. A detailed construction schedule was not available at the time of publication of the Draft EIR, and is not yet available as project design has not yet been completed. A detailed construction schedule, along with an accounting of corresponding impacts on varying habitat types will be included in the permit application that will be submitted to the CDFW for review and approval prior to construction.
A3	4	California Department of Fish and Wildlife	2-23	The comment states that the amount of rock slope protection (RSP) proposed as part of the project, as well as an evaluation of other feasible bio-engineering alternatives to minimize the amount of RSP, be included in the document.	Additional description of RSP, as it pertains to the potential to be used at the Pope-Chaucer bridge location, has been added to page 2-23 of the Final EIR. Several steps have been taken to conceptually plan for bio-engineering in the project design. The SFCJPA will work with CDFW and other knowledgeable organizations to refine the design to the extent feasible during permitting.
A3	5	California Department of Fish and Wildlife	2-24	The comment suggests evaluating other methods to reduce the amount of soil nail hardscape proposed at Site 5. The comment also expresses concern that the sacked concrete proposed for use is typically not stable for long-term bank protection and will eventually be eroded; the commenter recommends against the use of sacked concrete.	The SFCJPA is considering the use of sheet-pile wall at sites 1 through 5 to minimize temporary and permanent impact and reduce other hard scape treatments, such as sacked concrete. Note that the possible use of sheet-pile wall at sites 1 through 4 is a change from the Draft EIR, and is reflected on page 2-24 of the Final EIR.
A3	6	California Department of Fish and Wildlife	Figure 2-3 / 2-19; Figure 2-4 / 2-20; 2-34	The comment states that the location of the two proposed parks, as well as the proposed plantings to be used at each park, should be included in the document. The comment further states that the EIR should specify the plant species composition of the landscaping, which should be composed of native species only.	The locations of the potential top of bank Creekside parks are shown in Figures 2-3, page 2-19, and 2-4, page 2-20, in the Final EIR. With respect to the request regarding specifying the plant species composition, page 2-34 of the Final EIR has been revised to state that landscaping will consist of native plants local to the watershed.
A3	7	California Department	2-25	The comment requests clarification of storage of construction vehicles and equipment in the dewatered areas of the creek channel and that	All construction vehicles and equipment will be stored within dewatered portions of the channel when not in

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		of Fish and Wildlife		Figures 2-3 through 2-6 be revised to indicate instream staging areas separate from instream construction areas.	use. A clarification has been made to the text on page 2-25 of the Final EIR. A detailed assessment of instream staging areas, distinct from instream construction areas, is not available at the level of design that was used to inform the Draft EIR, and therefore has not been included in the Draft EIR. Detailed instream construction areas and instream construction staging areas will be included in permit applications that will be sent to the CDFW for review and approval prior to construction.
A3	8	California Department of Fish and Wildlife	N/A	The comment notes that the feasibility of partially dewatering the creek, versus complete dewatering of the creek, needs to be explained, as there would be less impacts to the movement of California Central Coast steelhead and other native migrating fish.	Instream construction will occur between June 1 and October 15, when the majority of the creek will be dry, so complete dewatering will not be required.
A3	9	California Department of Fish and Wildlife	N/A	The comment notes that the Draft EIR does not include a description of the current operation and maintenance activities for the creek and whether those activities were previously analyzed under CEQA.	The SFCJPA conducts annual stream maintenance walks prior to the rainy season and assigns actions to each responsible entity- including Palo Alto, East Palo Alto, Stanford, San Mateo County and/or Santa Clara Valley Water District. The scope of these annual operation and maintenance activities, such as debris removal or cutting of fallen trees, is categorically exempted from CEQA [§ 757. Exempt Projects] as a Class 1 activity for, “*operation, repair, or maintenance or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of use beyond that previously existing*.” The Santa Clara Valley Water District’s Stream Maintenance Program, applicable only to the Santa Clara County side of the creek, includes vegetation management, sediment and debris removal, erosion control and/or maintenance and repairs of flood control structures and facilities. These activities have been previously evaluated under CEQA and are performed in accordance with their Stream

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					Maintenance Permit with the Water Board that specifies annual work limits, avoidance and minimization measures, compensatory mitigation, long term monitoring and annual reporting. .[1]
A3	10	California Department of Fish and Wildlife	3.3-25; Figures 3.3-2a, 3.3-2b, 3.3-3a, 3.3-3b / 3.3-27 – 3.3-33	The comment notes that an analysis of the impacts of the physical alterations to the creek as a result of the construction of the proposed floodwalls on streamflow and aquatic habitat should be conducted. The comment also states that the EIR should fully analyze the type and duration of proposed project impacts for each habitat type within the project site and incorporate mitigation measures, as the habitat assessment previously conducted is out of date.	Velocity changes for the Channel Widening Alternative are discussed in the EIR. Because the Floodwall Alternative is not the proposed project, an analysis of velocity changes is not required under CEQA. (CEQA Guidelines Section 15126.6(d).) The database lists for the special-status plant and wildlife species were obtained in 2019. Information on the databases has been updated in the Final EIR on page 3.3-25, and the CNDDB figures (Figures 3.3-2a, -2b and 3.3-3a, -3b) show species occurrences. Habitat conditions have not changed due to the urban nature of the project area, and Figure 3.3-1 shows the land cover types in the project area. No habitat assessment was done in Reach 3 because it is private property, and SFCJPA was not permitted to access the area. A habitat assessment would be completed if a Reach 3 alternative is pursued.
A3	11	California Department of Fish and Wildlife	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment states that the number of trees to be impacted by the proposed project needs to be more clearly described, as well as whether these trees are in the riparian corridor or in upland locations. In addition, it states that the EIR should include more defined mitigation measures to compensate for impacts to both riparian and upland vegetation.	Additional information regarding trees that may be removed during construction has been added to Table 3.3-7, pages 3.3-78 to 3.3-82, and Figures 1 to 3 in Appendix B of the Final EIR. In addition, Impact BIO-2's discussion of potential impacts to riparian habitat and riparian restoration has been updated to better describe and quantify impacts to sensitive natural communities and land cover types. MM-BIO-8 includes measures to restore riparian habitat. The discussion of tree impacts in Impact BIO-5 has also been updated to provide more information on tree species, diameter at breast height, and location (pages

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[1] Final Subsequent Environmental Impact Report for the Santa Clara Valley Water District Stream Maintenance Program Update 2012-2022, December 2011.

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					3.3.78 to 3.3-80), and MM-BIO-13 has been revised to note that trees may be subject to CDFW regulations and would be compensated under the Streambed Alteration Agreement (page 3.3-81). Mitigation for tree loss will also be coordinated with the cities, in compliance with each city's tree protection requirements. .
A3	12	California Department of Fish and Wildlife	3.3-64 – 3.3-66; 3.3-78 – 3.3-80	The comment states that the Draft EIR should clearly describe all impacts to oak woodlands, as well as incorporate a mitigation and monitoring plan to account for the slow growth rate of certain plant species, like oak trees.	As discussed under Impact BIO-2, valley oak riparian, open water, and urban land cover types are the only habitat types that are expected to be impacted by the project. Blue oak woodlands, Coastal oak woodlands, and Valley oak woodlands would not be impacted. Revisions to Impact BIO-2 have been made to better describe and quantify impacts to sensitive natural communities and land cover types. Some oak trees within the Valley Oak Riparian land cover type will be removed due to project activities (See Impact BIO-5 and Table 3.3-7, pages 3.3-78 to 3.3-80). As discussed in MM-BIO-8, a mitigation and monitoring plan will be implemented to restore any permanently affected riparian habitat at a mitigation-to-impact ratio of 2:1 and restoring temporarily affected habitat at a minimum impact-to-mitigation ratio of 1:1 to ensure no net loss of riparian habitat in the affected stream reaches. This plan will include a monitoring period of at least 5 years to account for slow-growing tree species.
A3	13	California Department of Fish and Wildlife	3.3-98	The comment states that further assessment for the potential of the California tiger salamander to occur in Reach 2 is needed. In addition, the comment states that the EIR should analyze other feasible mitigation alternatives to fencing and barriers, such as sizing the basin, to minimize mortality for California red-legged frog.	The Reach 2 project sites do not provide habitat for California tiger salamanders. There are no ground squirrel burrows for upland habitat and most of the banks are hardscaped, mainly with sacked concrete. Flows in the winter during California tiger salamander breeding season are very high and variable, with flow velocities above 2 cubic feet per second (cfs) during precipitation events. In the Final EIR MM-BIO-19 ("Prevent California red-legged frog and other amphibians and reptiles

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					from entering the detention basin") has been revised to MM-BIO-19 ("Perform maintenance on the detention basin during the dry season") (page 3.3-98). The revised mitigation measure would require that SFCJPA perform maintenance (i.e. dredging) on the detention basins during the dry season, after the amphibian breeding season is over and when the detention basins are dry. The revised MM-BIO-19 further requires that a preconstruction survey be done of the detention basins to determine if any California red-legged frog, Santa Cruz black salamander, California giant salamander, and California tiger salamander are present. This revised mitigation measure would address potential impacts to California red-legged frogs that may be attracted to the detention basins, while avoiding potential issues with the original fencing mitigation measure. Other ideas such as sizing the basin or managing the hydroperiod were taken in consideration, but this approach was determined to be the least invasive resulting in the lowest probability of take.
A3	14	California Department of Fish and Wildlife	N/A	The comment states that a more thorough habitat assessment should be conducted for longfin smelt and that Table 3.3-3 should be revised as necessary. The comment also notes that pile driving impacts could result in the take of longfin smelt if they are present during construction.	Longfin smelt typically stay in brackish water and are found further south in the South Bay, toward Alviso Slough and the restored salt ponds in the spring months during spawning (Hobbs 2019)[2]. It is unlikely that they would migrate up San Francisquito Creek to the Pope-Chaucer Bridge, which is approximately 3.4 miles upstream from the Bay, and be exposed to pile driving from bridge replacement activities.
A3	15	California Department	Table 3.3-3 / 3.3-49	The comment suggests consulting with the CDFW to modify the following sentence or remove it altogether from the document: "…the	The sentence was removed from Table 3.3-3 in the Final EIR, page 3.3-49.

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[2] Hobbs Lab at UC Davis. 2019. Fish in the Bay – February 2019, UC Davis trawls – longfin alert! Spawning confirmed for 2019! http://hobbslab.com/2019/02/10/fish-in-the-bay-february-2019-uc-davis-trawls-longfin-alert-spawning-confirmed-for-2019/. Accessed: July 25, 2019.

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		of Fish and Wildlife		project area is situated entirely in an intergrade zone of snakes that are genetic hybrids of San Francisco garter snake (SFGS) (*Thamnophis sirtalis tetrataenia*) and red-sided garter snake (*Thamnophis sirtalis parietalis*); these intergrades are not considered to belong to either species and not protected as such…”	
A3	16	California Department of Fish and Wildlife	Table 3.3-3 / 3.3-49	The comment states that to better assess direct/indirect impacts of the proposed project on the salt harvest mouse, salt-marsh wandering shrew, California Ridgeway’s rail, and California black rail, the EIR should consider the proximity to Reach 1 and the staging area as potential suitable habitat for these species. Additionally, the Draft EIR needs to provide more details and justification in concluding that there would be no impact to the San Francisco dusky-footed woodrat in Reach 2. The comment also notes that Townsend’s big-eared bat is no longer a state candidate species under CESA.	Suitable wetland habitat for salt harvest mouse, salt-marsh wandering shrew, California Ridgeway’s rail, and California black rail is only within Reach 1, and is over 3,000 feet from the construction activities and staging area of the proposed project’s Site 5, the only Site that is even partially within Reach 1. There is no suitable habitat for these species within the area of the proposed project, therefore no direct or indirect impacts to salt harvest mouse, salt-marsh wandering shrew, California Ridgeway’s rail, or California black rail are anticipated. See Impact BIO-2 for the discussion of land cover types and sensitive natural communities that will be affected by project activities. Regarding San Francisco dusky-footed woodrats, no woodrat nests were observed during tree surveys in 2017 and 2018, and a biological monitor would survey woodrat nests before construction begins as described in MM-BIO-26. This survey information has been added to Table 3.3-3, page 3.3-49 in the Final EIR.
A3	17	California Department of Fish and Wildlife	N/A	The comment summarizes the regulatory requirements imposed by the CDFW that the EIR may be subject to.	SFCJPA will submit applications for all applicable state permits before project construction.
A4	1	San Francisco Bay Regional Water Quality Control Board	N/A	The comment provides introductory statements and a summary of the alternatives analyzed in the Draft EIR.	This comment does not raise a specific issue on the substance of the Draft EIR.
A4	2	San Francisco Bay Regional	N/A	The comment provides support for alternatives that would incorporate aquatic restoration	The objectives described in this comment match the preferred project’s objectives, although the comment

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		Water Quality Control Board		enhancements and recreational enhancements, and remove hydraulic constrictions in the Creek.	does not raise a specific issue on the substance of the Draft EIR.
A4	3	San Francisco Bay Regional Water Quality Control Board	3.3-71; 3.3-92 – 3.3-94	The comment expresses concern regarding potential impacts associated with the preferred project, including concerns that new hardscape would permanently degrade the benefits provided by existing vegetation such as nutrient cycling, shade, cover from predators, and a variety of foraging and rearing habitat.	The impact concerns related to project activities and modifications have been addressed in the Draft EIR Section 3.3, *Biological Resources*. Loss of vegetation, which includes trees and riparian vegetation, would be mitigated in kind. The modification of the Pope-Chaucer Bridge would include daylighting the creek channel and planting riparian vegetation in the vicinity of the bridge. Additionally, non-native plants would be removed upstream of Pope-Chaucer, and additional riparian vegetation would be planted in those areas, as reflected in Figure 3.3-4 of the Draft EIR. In addition, Impact BIO-6, pages 3.3-92 and 3.3-94, in the Final EIR has also been revised to include a discussion of potential habitat and hydraulic effects on fish resulting from the proposed project.
A4	4	San Francisco Bay Regional Water Quality Control Board	N/A	The comment notes that more information on aquatic habitat restoration features needs to be included in the document in order to properly assess mitigation for the proposed project's significant impacts. The comment states that a shear stress analysis should be conducted to analyze justification of bank stabilization treatments.	This level of detail is not required under CEQA, and is not required to analyze impacts and identify appropriate mitigation. The details of the aquatic restoration features will be developed during detailed design, and at that time the designs will be provided to regulatory agencies for review and comment. Because the proposed project will lower water surface elevation within the channel shear, stress is expected to decrease therefore a shear stress analysis was determined to not be necessary in order to analyze bank stabilization impacts. A description of this hydraulic principle will be provided to San Francisco Bay Regional Water Quality Control Board (RWQCB) during permitting.
A4	5	San Francisco Bay Regional Water Quality Control Board	N/A	The comment provides support for the removal of the concrete and sacked concrete at the five channel widening sites. Additionally, the comment states that geomorphic modeling should be conducted for all alternatives to	This level of detail is not required under CEQA, and is not required to analyze impacts and identify appropriate mitigation. More extensive modeling will be conducted for the selected project during the detailed design and permitting phases. The decision

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				support the choice of concrete and sheet pile bank stabilization methods over biotechnical bank protection measures.	to replace existing sacked concrete with sheet pile or soil nail wall was made not based on geomorphic conditions but on feasibility. It is not possible to achieve a stable natural slope for revegetation due to the existence of homes and other structures at the top of bank at these locations. Installation of vegetated crib walls or similar bio-engineering require over excavation and backfill, which would undermine existing structures and ultimately would not likely provide the needed channel geometry for flow conveyance. The footing of the proposed sheet pile or floodwall will feature placed rock or engineered streambed material and will be planted to create a condition similar to natural or bio-engineered banks under most flow conditions.
A4	6	San Francisco Bay Regional Water Quality Control Board	N/A	The comment provides suggestions for an Environmentally Superior Alternative.	The elements of the proposed project were carefully considered to balance impacts to the community and environment, while achieving the project objectives to the maximum extent feasible. Some of the suggested features of an environmentally superior alternative, such as the use of live crib walls, fabric reinforced earth fills, or soil biotechnical bank stabilization methods would jeopardize the ability of the channel to convey peak flood flows, and therefore would not achieve the project objectives to the maximum extent feasible. CEQA grants the lead agency with discretion to determine what constitutes a reasonable range of alternatives that accomplish most or all of the project objectives. The alternatives discussion is governed by a rule of reason, with the ultimate objective being to foster informed decision-making and an informed public. *Save Our Residential Environment v. City of West Hollywood* (1992) 9 Cal.App.4th 1745; CEQA Guidelines Section 15126.6(a). An EIR need not include multiple variations of the alternatives that it does consider. *Mira Mar Mobile Community v. City of Oceanside* (2004) 119 Cal.App.4th 477. In the Draft

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					EIR, the SFCJPA has proposed a reasonable range of alternatives that will be considered by the SFCJPA Board in deciding whether and how to proceed with this project.
A4	7	San Francisco Bay Regional Water Quality Control Board	N/A	The comment states that the Draft EIR should include design renderings of the proposed restoration enhancements and features and where they would be located.	The details of the aquatic habitat restoration features will be developed during detailed design, and at that time the designs will be provided to NMFS for review and comment. After design plans are finalized, they will be submitted with the appropriate permit applications.
A4	8	San Francisco Bay Regional Water Quality Control Board	N/A	The comment notes that the current version of the Floodwalls Alternative is more likely to be accepted by the local communities, as it would involve less hardscape and more natural bank stabilization treatments.	The SFCJPA has developed long-standing relationships with residents and local officials, and conducted extensive public outreach on potential project alternatives in order to conclude which alternative is achievable and meaningful to the local community. Public comments on the DEIR did not voice any support for the Floodwall and Channel Widening Alternative. The comment does not appear to raise an environmental issue under CEQA.
A4	9	San Francisco Bay Regional Water Quality Control Board	3.3-44	The comment states that the Draft EIR needs to explicitly describe the baseline environmental conditions involving the hydrologic, geologic, and biotic conditions in Reach 2 in relation to the Creek's designated beneficial uses.	The hydrology of the creek in the project area as it pertains to biological resources is discussed in the Draft EIR Section 3.3, *Biological Resources*, under Existing Conditions. The text on page 3.3-44 of the Final EIR has been revised to include more details on designated beneficial uses and hydrology. In addition, hydrology is discussed in greater detail in Section 3.8 and geology is discussed in Section 3.5.
A4	10	San Francisco Bay Regional Water Quality Control Board	3.3-92 – 3.3-94	The comment states that the Draft EIR should include analyses on the creek functioning as a migration corridor, as well as wintering habitat, to show how each of the alternatives and construction activities would minimize impacts to the aforementioned beneficial features. The comment also notes that if impacts to these features are significant and unavoidable, then appropriate mitigation measures should be incorporated into the Draft EIR.	The proposed project would result in some increase in hydraulic velocities at various areas of the creek (see Table 3.3-10) when flows reach 5,800 cfs. The Final EIR includes a comparison of velocities under existing conditions and with the proposed project (see *Hydraulic Effects*, page 3.3-92). Water temperature, fish migration, spawning, and use of the creek as wintering habitat will not change with the project, and wildlife use of San Francisquito Creek will not change from current conditions.

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A4	11	San Francisco Bay Regional Water Quality Control Board	3.3-11 – 3.3-57; 3.8-17; 3.8-38 – 3.8-41	The comment states that the Draft EIR should provide more details on the existing channel and riparian habitat in Reach 2 under winter and spring baseflow conditions, as well as beneficial uses. The comment also requests more detailed information from the hydraulic model utilized in the project's analysis and further analysis of sediment conditions and transport processes.	Section 3.3, *Biological Resources*, (pages 3.3-11 through 3.3-57), provides a comprehensive description of baseline conditions of aquatic and riparian habitat for evaluation of alternatives and identification of potential impacts on these resources. Additional detail has been added specifically to pages 3.3-11 and 3.3-12 with respect to winter and spring baseflow conditions. Designated beneficial uses for San Francisquito Creek are described in Section 3.8, *Hydrology and Water Resources* (page 3.8-17), and impacts designated beneficial uses are thoroughly assessed in Impact HWR-4. Extensive hydraulic and sediment transport modeling have been conducted, the results of which will be shared with RWQCB during the permitting phase.
A4	12	San Francisco Bay Regional Water Quality Control Board	3.3-75	The comment asks for clarification of the significance criterion for Impact BIO-4, as well as an explanation for what "intermittent drainage " is defined as in relation to the Project's location in the Creek.	Impact BIO-4 was revised in the Final EIR on page 3.3-75 to "Result in temporary or permanent changes to waters of the State or U.S.." "Intermittent drainage" was deleted.
A4	13	San Francisco Bay Regional Water Quality Control Board	3.3-75 – 3.3-77	The comment notes a revision to Impact BIO-4 significance criteria in order to reflect the 2019 CEQA Statute and Guidelines update. The comment also notes that the Draft EIR does not fully address impacts to waters and riparian areas of the State.	Impact BIO-4, pages 3.3-75 – 3.3-77 of the Final EIR, were revised to include more specific impacts to State and U.S. waters. Riparian impacts are discussed in great detail under Impact BIO-2.
A4	14	San Francisco Bay Regional Water Quality Control Board	N/A	The project states that the Draft EIR should be revised to include more detailed information concerning aquatic habitat restoration, including the extent, location, and types of restoration that the proposed project would incorporate.	The details of the aquatic habitat restoration features will be developed during detailed design, and at that time the designs will be provided to RWQCB for review and comment. After details are finalized, all plans will be submitted with the appropriate permit applications needed for the project.
A4	15	San Francisco Bay Regional Water Quality Control Board	3.3-64 – 3.3-69; Figure 3.3-4 / 3.3-71	The comment notes that the proposed project's temporary and permanent impacts are not fully defined or quantified and that further information and analysis is required.	Potential impacts to riparian and aquatic habitat are fully disclosed in Section 3.8.3, *Biological Resources*, of the Draft EIR. The Final EIR provides additional details in Impact BIO-2. Mitigation for temporary and permanent impacts to these resources are specified in

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					MM-BIO-8, MM-BIO-10, and MM-BIO-12, consistent with applicable tree protection regulations. The locations of areas identified for riparian enhancement/restoration are shown in Figure 3.3-4, page 3.3-71.
A4	16	San Francisco Bay Regional Water Quality Control Board	3.3-75 – 3.3-77	The comment states the significance conclusion reached for impacts related to construction activity by operation of heavy equipment in the creek channel and removal of in-channel vegetation does not provide sufficient analysis to reach this determination. The comment expresses disagreement with this conclusion, and states that the Draft EIR needs to be revised to address these potentially significant impacts.	Impact BIO-4, page 3.3-75 – 3.3-77 of the Final EIR, was revised to include more specific information and analysis related to the potential impacts to Waters of the State or U.S. by operation of heavy equipment in the creek channel and removal of in-channel vegetation. Channel substrate is expected to return to its natural state after high flows from precipitation events disturb the channel bottom. Willows grow in the channel when flows recede in the spring and summer and are then torn out from high flows during the winter. Presence of willows in the channel varies from year to year.
A4	17	San Francisco Bay Regional Water Quality Control Board	3.3-92 – 3.3-94	The comment states that channel modification would result in degradation of the Creek’s COLD, MIGR, SPWN, and RARE beneficial uses and the Draft EIR must be revised to fully evaluate this impact.	The proposed project would result in some increase in hydraulic velocities at various areas of the creek (see Table 3.3-10 in the Draft EIR) when flows reach 5,800 cfs. The Final EIR includes a comparison between existing conditions and project conditions (see *Hydraulic Effects*, 3.3-92 to 3.3-94. Water temperature, fish migration, and spawning will not change with the project, and wildlife use of San Francisquito Creek will not change from current conditions.
A4	18	San Francisco Bay Regional Water Quality Control Board	3.3-64 – 3.3.68; Table 3.3.7 / 3.3-78 – 3.3-80	The comment states that more information on the nature and extent of impacts to riparian vegetation needs to be included in the Draft EIR.	Impact BIO-2 has been updated in the Final EIR to provide more information on temporary and permanent impact acreages for riparian vegetation and Impact BIO-5 has also been updated with tree species and project sites (Table 3.3-7, page 3.3-78 to 3.3-80).
A4	19	San Francisco Bay Regional Water Quality Control Board	3.3-64 – 3.3-66; 3.3-92 – 3.3-94; 3.3-96	The comment states that some of the Draft EIR’s findings of significant impacts do not fully address the significance criterion. Specifically, impacts to biological resources should be revised to analyze project impacts on functions	Additional text was added to Impact BIO-2, on page 3.3-64 to 3.3-66, Impact BIO-6 Result in effects on steelhead trout and suitable habitat (including native fish) *Operations and Maintenance*, on page 3.3-92 to 3.3-94 of the Final EIR, and Impact BIO-7 Result in

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				and values (like nutrient cycling, shade, and cover), as well as impacts of the Channel Widening Alternative (the proposed project) on the riparian corridor.	effects on California red-legged frog and habitat, on page 3.3-96, regarding impacts to water temperature, cover, and invertebrates from riparian vegetation removal and specifically to these resources.
A4	20	San Francisco Bay Regional Water Quality Control Board	3.3-92 – 3.3-94; 3.3-96; 3.3-99 – 3.3-100; 3.3-104	The comment notes that the Draft EIR focuses only on construction-related impacts of sedimentation for Impacts BIO-6, BIO-7, BIO-8, and BIO-10, and that these impacts should be revised to analyze the impacts of the Channel Widening Alternative on habitat features that support the species listed in the impacts.	Under Impact BIO-6, text has been added under Operations and Maintenance on page 3.3-92 to 3.3-94, Impact BIO-7, page 3.3-96, and Impact BIO-8 on page 3.3-99 to 3.3-100, discussing the Adaptive Management program addressed in Chapter 3.8, *Hydrology and Water*, to monitor areas of possible erosion and the resulting sedimentation release. The Adaptive Management Plan would identify management triggers that indicate when erosion control responses are required and ongoing monitoring would determine the effectiveness of the adaptive management actions. Text has been added under Impact BIO-10 on page 3.3-104, discussing the loss of street trees and riparian trees on nesting birds. Any tree removal will be compensated for by replanting native trees and riparian vegetation and birds would be able to nest in other areas of San Francisquito Creek.
A4	21	San Francisco Bay Regional Water Quality Control Board	3.3-82 – 3.3-83	The comment asks to clarify whether the proposed soil-nail walls would impact the tree roots of existing trees and to what extent feasible tree root avoidance is possible during construction activities.	MM-BIO-13, page 3.3-82 to 3.3-83 discusses hiring a licensed arborist to monitor removal of sacked concrete and drilling for soil nails when near existing trees. If injury should occur to any tree during construction, the tree will be evaluated as soon as possibly by the Project Arborist so that appropriate treatments can be applied. Additional compensation in the form of mitigation planting will be considered if treatments cannot fully mitigate damages to protected trees.
A4	22	San Francisco Bay Regional Water Quality Control Board	3.5-44 – 3.5.45, 3.8-32 – 3.8-33	The comment states that the Draft EIR needs to provide clarification on the proposed project’s impacts on bank stability and erosion and the number of erosion watch sites. The comment also states that mitigation measures should be	The Final EIR includes updated text on pages 3.5-44 and 3.5-45 of Section 3.5,*Geology and Soils*, to clarify the project’s impacts related to bank stability and erosion. More specifically, these changes reflect the correct number of erosion sites, where creek velocity

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				incorporated to minimize these impacts and that the proposed mitigation measure HWR-1 in the Draft EIR lacks sufficient detail to comply with CEQA.	may increase in the short term during large flood events (11), and identifies the number of erosion monitoring sites, which would be monitored during large storm events due to their proximity to houses and infrastructure (5). To reduce project-related impacts to soil erosion and loss of topsoil, the Draft EIR provided mitigation (MM-HWR-1), which requires SFCJPA to prepare and implement an Adaptive Management Plan that would require monitoring and adaptive management to identify and address potential accelerated erosion at flow rates over 5,800 cfs. While CEQA does not allow for the formulation of mitigation measures to be deferred until some future time, it does allow the lead agency to develop the specific details of a mitigation measure after project approval, when it is impractical to include those details during project review, provided that the agency commits itself to the mitigation, adopts specific performance standards that the mitigation will achieve, and identifies the types of actions that can feasibly achieve the standards [CEQA Guidelines Section 15126.4 (a)(1)(B)]. While MM-HWR-1 states that an Adaptive Management Plan will be developed in the future, it also provides details on the plan, including monitoring locations and methods, adaptive management triggers, and management actions. The Plan will evaluate the response of the creek system to storm events over 5,800 cfs, assess erosion and streambank stability, and monitor effects on applicable public and private structures near the top of the creek banks. The monitoring program will include a list of sites to be monitored; methods for monitoring each site, including monitoring frequency and location of monitoring stations; and an explicit timetable for the monitoring program, including data collection and

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					data analysis. In addition, the Plan will apply qualitative and quantitative geomorphic and engineering techniques for evaluation of collected data, identify an action and plan to implement interim and long term erosion control measures for erosion sites where accelerated erosion occurs, and provide for ongoing monitoring to determine the effectiveness of the Plan. To clarify the requirements of the Adaptive Management Plan, the Final EIR revises MM-HWR-1 to include a more detailed list of components that the Plan must include. The revisions also clarify SFCJPA's responsibilities in the case that accelerated erosion is identified under the Plan during project operation.
A4	23	San Francisco Bay Regional Water Quality Control Board	3.8-32 – 3.8-33	The comment states disagreement with MM-HWR-1, *Preparation of an Adaptive Management Plan*, because the current measure does not include the information that would be provided in the actual Plan, such as issues to be addressed, management goals, and potential actions. The comment states that this information is needed in order to comply with CEQA.	See response to comment A4-22, above.
A4	24	San Francisco Bay Regional Water Quality Control Board	3.3-64 – 3.3-77	The comment states that the Draft EIR does not provide enough details and analysis of impacts and proposed mitigation measures BIO-8 and BIO-10 to support future consideration of a Water Quality certification.	Potential impacts to riparian and aquatic habitat are fully disclosed in Section 3.3, *Biological Resources*, of the Draft EIR under Impact BIO-2, Impact BIO-3, and Impact BIO-4. Mitigation for temporary and permanent impacts to these resources are specified in MM-BIO-8; MM-BIO-10; and MM-BIO-12. The locations of areas identified for riparian enhancement/restoration are shown in Figure 3.3-4, page 3.3-71. Additionally, both MM-BIO-8, and MM-BIO-10, specify that the SFCJPA will prepare a Habitat Mitigation and Monitoring Plan in the context of the federal and state permitting processes under the Clean Water Act and California Fish and Game Code,

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					which would include success criteria as specified by the permitting agencies. Final details and specific requirements will be determined in consultation with the RWQCB and other agencies through the Clean Water Act (Section 401 Water Quality Certification) and California Fish and Game Code (Section 1600 Lake or Streambed Alteration Agreement.
A4	25	San Francisco Bay Regional Water Quality Control Board	3.3-77 – 3.3-84	The comment expresses disagreement with MM-BIO-12 because the mitigation measure only addresses the requirements of local jurisdictions' tree ordinances. The comment also states that the SFCJPA should work with other agencies to determine the appropriate mitigation measures for Impact BIO-5, in order to account for the temporal loss and the Creek's functions associated with the removal of trees.	Impact BIO-5, page 3.3-77 to 3.3-84, specifically addresses impacts to locally protected trees planted above the creek at the top of bank near residences. Each city has its own requirements for tree removal, which will be implemented depending upon what trees are removed. Riparian vegetation removal and compensation is discussed under Impact BIO-2.
A4	26	San Francisco Bay Regional Water Quality Control Board	3.3-92 – 3.3-94	The comment expresses disagreement with MM-BIO-17 because the mitigation measure accounts for potential impacts associated with project construction, but not for potential impacts associated with the actual project design. The comment states that the EIR should provide further detail on project design before establishing sufficient mitigation measures.	Text has been added to Impact BIO-6, under Operations and Maintenance Effects from project implementation. Habitat and hydraulic impacts from project elements are discussed in detail on pages 3.3-92 to 3.3-94. Aquatic habitat enhancement areas in Reach 2 and riparian vegetation plantings in other sections of San Francisquito Creek will enhance rearing habitat for juvenile steelhead. Preparation of an Adaptive Management Plan to monitor creek flows for signs of increased erosion at 11 sites will identify and implement additional erosion control as needed. Ongoing monitoring would determine the effectiveness of the adaptive management actions.
A4	27	San Francisco Bay Regional Water Quality Control Board	3.8-32 – 3.8-33	The comment expresses disagreement with MM-HWR-1, and states that the EIR should incorporate adequate mitigation for temporary and permanent changes to waters of the U.S. and waters of the State, impacts from soil erosion or loss of topsoil, and impacts on water quality.	See response to comment A4-22, above.
A4	28	San Francisco Bay Regional	N/A	The comment states that wetland delineations performed by the U.S. Army Corps of Engineers	The SFCJPA will work with the U.S. Army Corps of Engineers to verify the existing wetland delineation

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		Water Quality Control Board		are typically valid for 5 years, but may be extended. The comment also states that the wetland delineation mentioned in MM BIO-11 was conducted in July 2013 and that valid delineations are needed for permit applications to the RWQCB.	prior to submitting a permit application to the RWQCB.
A4	29	San Francisco Bay Regional Water Quality Control Board	N/A	The comment asks for more details on the alternatives screening process, and asks why certain alternatives were rejected from further analysis. The comment also states that the RWQCB submitted a project alternative “Maximize Non-Structural Flood Damage Reduction Measures,” in a comment letter in response to the NOP, and that this was not included.	CEQA Guidelines Section 15126.6(c) requires that an EIR briefly describe the rationale for selecting the alternatives to be discussed, identify any alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process, and briefly explain the reasons underlying the lead agency’s determination. An EIR must describe a range of reasonable alternatives to the project or to its location, but need not discuss every alternative to the project. Instead, an EIR should present “a reasonable range of potentially feasible alternatives.” CEQA Guidelines Section §15126.6(a). Case law supports the notion that an EIR need not include multiple variations on the alternatives it does consider, when the relative advantages and disadvantages of other, similar alternatives can be assessed from a review of the alternatives presented in the EIR. *Mira Mar Mobile Community v. City of Oceanside* (2004) 119 Cal.App.4th 477. As such, evaluation of a “maximize non-structural flood damage reduction measures” alternative (as suggested by the commenter), which is similar to Alternative 17 is not required. Nor is additional analysis required of other permutations of other alternatives similar to those considered. As permitted by CEQA Guidelines Section 15126(c), additional evidence supporting SFCJPA’s decision as to which alternatives were selected may be found in the administrative record.
A4	30	San Francisco Bay Regional	2-3	The comment states that the proposed project is likely to require authorization from the U.S. Army Corps of Engineers, pursuant to Section	The Draft EIR acknowledged in Section 2.4.2, *Least Environmentally Damaging Practicable Alternative*, the need for an additional evaluation to determine the

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		Water Quality Control Board		404 of the Clean Water Act, and to require certifications from the RWQCB, pursuant to Section 401 of the Clean Water Act, for water quality certification and waste discharge requirements.	Least Environmentally Damaging Practical Alternative, consistent with Section 404(b) of the federal Clean Water Act. Furthermore, the SFCJPA will be required to obtain a Clean Water Act Section 401 Water Quality Certification from the RWQCB prior to construction.
A4	31	San Francisco Bay Regional Water Quality Control Board	3.3-60 – 3.3-61	The comment states that the RWQCB is not familiar with the reference, “Santa Clara Valley Water District Guidelines and Standards for Land Use near Streams, Design Guide 5, Temporary Erosion Control Options,” and that the reference should be replaced with the District’s Stream Maintenance Program Standard Best Management Practices for impact avoidance and minimization for working in and around creeks and wetlands. In addition, the comment states that Draft EIR should include mitigation measures to prevent the spread of the plant pathogen, *Phytophthora spp.*	MM-BIO-2 was updated in the Final EIR to include the Santa Clara Valley Water District Stream Maintenance Program Update 2014-2023, Best Management Practices (page 3.3-60 to 3.3-61). The SFCJPA implemented best management practices (BMPs) to prevent the spread of *Phytophthora spp.* in the San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project (San Francisco Bay to Highway 101), and will continue to follow the California Oak Mortality Task Force’s Phytophthora BMPs for upstream construction and revegetation activities. This has also been added as a component of MM-BIO-2 (page 3.3-61).
A4	32	San Francisco Bay Regional Water Quality Control Board	2-33; 3.2-19; 3.4-19	The comment notes that the description of the proposed soil-nail wall on pages 3.2-19, and 3.4-19 states that a soil nail wall would be vegetated, but that page 2-31 states that significantly more analysis is needed before determining whether planting vegetation at the toe of the bank or soil nail walls is feasible. The comment also notes that the Draft EIR should be revised to show whether soil bank stabilization methods are feasible and if soil-nail walls can incorporate vegetation on the toe rock slope and tops of walls.	The description referenced on page 2-33 regarding additional analysis of vegetation pertains to areas with rock slope protection, and does not refer to sheet pile walls. Furthermore, the suggestion in the comment that this description states significantly more analysis is needed before determining whether planting vegetation is feasible is not an accurate characterization of what is described in the EIR. The list of four factors provided on page 2-33 of the Draft EIR was intended to provide the reader with an understanding of the issues considered when planting vegetation. The SFCJPA has determined that vegetation can be planted at the toe of all areas with proposed rock slope protection. However, the description on pages 3.2-19 and 3.4-19 of the Final EIR have been revised so that they no longer state that

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					soil nail walls would be vegetated, as it is not certain at this time that that is feasible. Details of the soil-nail walls or other bank revetment will be developed during the design phase of the project. Vegetation can be incorporated at the toe and top of bank along any of the structures being considered, and will be developed with input from regulatory agencies. It is not possible to achieve a stable natural slope for a revegetated soil bank due to the existence of homes and other structures at the top of bank at these locations. Installation of vegetated crib walls or similar bio-engineering methods require over excavation and backfill, which would undermine existing structures and ultimately would not likely provide the needed channel geometry for flow conveyance. The footing of the proposed sheet pile or floodwall will feature placed rock or engineered streambed material and will be planted to create a condition similar to natural or bio-engineered banks under most flow conditions.
A4	33	San Francisco Bay Regional Water Quality Control Board	3.3-61	The comment states that leaving gravel or wood mulch in place as much as possible to prevent soil compaction would not mitigate impacts to special-status plant species as proposed in MM BIO-2.	This portion of MM-BIO-2 has been removed from the Final EIR (page 3.3-61).
A4	34	San Francisco Bay Regional Water Quality Control Board	N/A	The comment notes that the Draft EIR should be revised to better detail existing conditions and potential impacts, as well as proposed mitigation measures.	Existing conditions, potential impacts, and mitigation measures have been described in this EIR. The comment fails to identify any specific deficiencies in the substance of the EIR.
A5	1	City of Palo Alto	N/A	The comment provides introductory statements and a summary of the preferred project.	This comment does not raise a specific issue on the substance of the Draft EIR.
A5	2	City of Palo Alto	3.10-16 - 3.10-18	The comment notes that the construction hours depicted in the Draft EIR should be consistent with the Municipal Code for construction work within the jurisdiction of the City of Palo Alto.	The Final EIR has been revised to state that construction activity would comply with the City of Palo Alto's noise restrictions where feasible, and would result in a significant and unavoidable impact where not feasible (page 3.10-14). The contractor will be required to obtain a permit for such

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					construction activity prior to commencement of work outside of the allowable hours. Nevertheless, because the allowable work hours specified in the City of Palo Alto's noise restrictions may be exceeded in some circumstances, the impact would be significant and unavoidable.
A5	3	City of Palo Alto	3.10-15	The comment states that "prolonged exposure to project-specific construction noise levels that are twice as loud as the ambient noise level in which the receiver is accustomed to" is considered significant and that this needs to be discussed in more detail. In addition, the comment recommends that mitigation measure NV-3 be refined so that the measure is implemented proactively in order to reduce construction noise levels for nearby sensitive receptors.	It is noted that the City of Palo Alto considers a 10 dB increase in hourly noise levels above ambient conditions to be significant, if the increase occurs for 2 or more hours a day, 5 days a week, for more than 12 months. Because project construction would not occur in any general area for more than 12 months, construction would not in this instance be considered long-term. Additional discussion to elaborate on this threshold has been added to the page 3.10-7 of the Final EIR. Regarding the suggestion to implement MM-NV-3 proactively rather than in response to complaints, noise barriers are not included as a default for all activity, due to the temporary aesthetic concerns such barriers may cause residents.
A5	4	City of Palo Alto	3.14-7	The comment states that the location of existing utility infrastructure, who owns it, and where it anticipated to be relocated needs to be included.	While the exact location of and ownership of all existing utility infrastructure located in the project vicinity is not identified in the EIR, Impact UT-1 in Section 3.14, *Utilities*, describes the utility relocation that would be required during project construction. The information provided in the EIR is sufficient to determine whether project construction would result in adverse effects on utilities, including the potential for service interruption. Utility infrastructure, as well as details on relocation, if any, will be mapped as part of final design.
A5	5	City of Palo Alto	N/A	The comment states that due to the significant and unavoidable impact conclusions reached in the Draft EIR, an Architectural Review is required, and the City of Palo Alto City Council	The SFCJPA has engaged City planning staff to schedule Architectural Review Board review this fall. This comment does not raise a specific issue on the substance of the Draft EIR.

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				would have to issue a final approval concerning aspects of the project within its jurisdiction.	
A5	6	City of Palo Alto	3.13-8 – 3.13-9	The comment suggests in order to minimize the duration of pedestrian detours, shuttles or other detour assistance should be provided as part of MM TT-2.	As required by MM-TT-2, a site-specific traffic control plan will be developed by the construction contractor to minimize the effects of construction traffic on surrounding roadways. Among the requirements included in the plan would be to provide 72-hour advance notification to affected residents or businesses if access to driveways or private roads will be affected or limit effects on driveway and private roadway access to working hours and ensure that access to driveways and private roads is uninterrupted during non-work hours. If necessary, use of steel plates, temporary backfill, or another accepted measure will be provided to ensure access. The plan will be subject to review and approval by the Cities of Palo Alto, Menlo Park and East Palo Alto. This input will take into account input regarding ways to minimize the duration of pedestrian detours, including shuttles. In addition to the measures that could be incorporated into the traffic control plan, stakeholders would be encouraged to utilize existing services, such as the free Palo Alto Shuttles.
A5	7	City of Palo Alto	N/A	The comment notes that the traffic analysis should include an evaluation of the intersections at Middlefield Road and University Avenue, and Middlefield Road and Lytton Avenue, since they are part of the designated detour route and already operate close to capacity under existing conditions.	The SFCJPA consulted with the City of Palo Alto prior to initiating the traffic analysis for the Draft EIR to select intersections to study for the proposed project. Furthermore, the City's General Plan EIR demonstrates operation of the Middlefield/University intersection at LOS C in 2016 and projected continued operation of that intersection at LOS C in all scenarios through 2030. A qualitative assessment of the number of trips that would be routed through this intersection during bridge closure conditions suggests that this intersection would continue to operate at LOS C (above the City's criteria of LOS E for unacceptable intersection operations). The SFCJPA has not found current information regarding operation of the

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					intersection at Middlefield and Lytton, however an EIR need not evaluate every intersection in the general vicinity of a proposed project, especially intersections a half mile away.
A5	8	City of Palo Alto	N/A	The comment states that the signal queue proposed as part of MM TT-1 should be analyzed to determine how long queues would extend into Palo Alto, and whether or not this would affect upstream intersections.	The Traffic Analysis Report included in Appendix E of the Draft EIR indicated that the 95th percentile queue for westbound direction traffic would extend approximately 950 feet into Palo Alto, past Palo Alto Avenue and Hawthorne Avenue along Middlefield Road. While the queue would extend past Hawthorne Avenue, vehicles from Hawthorne Avenue are currently restricted from making a left turn onto Middlefield Road, so there would be no impacts to those vehicles.
A5	9	City of Palo Alto	N/A	The comment notes that the University Avenue and Woodland Avenue intersection, as well as the U.S. 101 Southbound and University Avenue intersection, were not evaluated.	The University Avenue and Woodland Avenue intersection was analyzed as Intersection #9 in the Traffic Analysis Report prepared by TKJM (included as Appendix E of the Draft EIR). With respect to the U.S. 101 Southbound/University Avenue intersection, the SFCJPA estimates around 4,000-4,500 vehicles entering this intersection, based on observations and knowledge of the study area. Bridge closure conditions would result in the diversion of approximately 60 vehicles to this intersection in the a.m. peak and approximately 40 vehicles in the p.m. peak hour. These additional trips are roughly 1% of the total intersection volumes, which would make the impacts less than significant.
A5	10	City of Palo Alto	3.8-9/Table 3.8-1	The comment notes that there is a discrepancy on the amount of creek flow for a 100-year flow on page 3.8-9 and Table 3.8-1.	The text on page 3.8-9 of the Draft EIR has been updated to reflect the more recent modeled 100-year flows at the Stanford Golf Course and the Palo Alto Airport. Table 3.8-1 accurately provides estimated 100-year flows at the four bridges listed in the table.
I1	1	Darshana Greenfield	N/A	The comment provides a quote by R. Buckminster Fuller and states that the Pope-Chaucer Bridge will need lots of native plantings and trees.	As described in Section 3.3, *Biological Resources*, of the Draft EIR, the project would be required to comply with local general plan policies requiring revegetation of disturbed areas after construction.

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					Additionally, implementation of MM-BIO-2 would be required to ensure that disturbed areas are revegetated with local ecotypes of native plants.
I2	1	Ann Crichton		The comment asks how more information on San Francisco Bay flood abatement plans and actions could be accessed.	Information on the SFCJPA's efforts to reduce the flood risk facing people and property in Palo Alto, including along Palo Alto's Bay shoreline, can be found at sfcjpa.org.
I3	1	Pat Samuel	2-5	The comment states that more information on plans and discussion of Searsville dam need to be included.	As described in Chapter 1, *Introduction*, of the Draft EIR, the SFCJPA is working with Stanford University to enable the implementation of a project at Searsville Dam, which the University has studied for many years. This work shows that a project at Searsville could detain floodwaters upstream of the flood prone area and thus provide protection to communities downstream of Stanford. Constructing such a project at Searsville (or at one of the other potential basin sites) would not, by itself, protect communities against a 100-year flood event, but it could provide that level of protection if done in concert with the SFCJPA's proposed project. At this time, the SFCJPA needs more information to analyze and move forward with an upstream detention project within Reach 3. The text on page 2-5 has been clarified in the Final EIR to provide further clarity on upstream detention within Reach 3.
I3	2	Pat Samuel	N/A	The comment states that due to the lack of information on Searsville dam, the cumulative analysis is incomplete and must be revised.	As stipulated in Section 15130(a)(1) of the CEQA Guidelines, an EIR should not discuss impacts which do not result in part from the project evaluated in the EIR. Further, pursuant to Section 15130(b), the discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. Accordingly, the Draft EIR includes a discussion and analysis of cumulative impacts that could occur as a result of construction and operation of the proposed project in conjunction

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					with all reasonably foreseeable cumulative projects that were known as of the time that the Draft EIR was circulated for public review. The cumulative analysis includes a discussion of a project at the Searsville Dam and Reservoir, which is based on details that are known to the SFCJPA as of the date of publication of the Draft EIR. There is sufficient information to support the findings provided in the Draft EIR, in particular those related to water quality and sedimentation effects. No changes have been made in response to this comment.
I3	3	Pat Samuel	N/A	The comment notes that there is no analysis of utilizing Upper Marsh near Portola Road as a detention basin.	Upper Marsh near Portola Road is a remnant of the original Searsville Reservoir footprint and therefore would likely be included in a future project at Searsville Dam and Reservoir, should that project move forward.
I3	4	Pat Samuel	N/A	The comment notes that there is no analysis of sea level rise and climate change in each of the impact sections, and it therefore needs to be revised.	The evaluation of potential climate change effects has been a part of the San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project since project design began 10 years ago on the recently completed portion from San Francisco Bay through Highway 101. That section of the comprehensive project protects three miles of shoreline/creek bank against the maximum flow that could reach that area with a sea level 10 feet above today’s daily high tide, making it the largest multi-jurisdictional sea level rise project built in California to date. Because daily tides extend upstream of Highway 101 into the reach of the project proposed here, this same criteria is incorporated into the design of this project. Proposed project elements are at an elevation well above projected sea level rise over the next 50 years. Climate change impacts associated with construction and operation of the proposed project are disclosed in Section 3.6, *Greenhouse Gas Emissions and Climate Change*.

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I4	1	Paul Martin	2-7 – 2-10	The comment states that Pope-Chaucer Bridge should be a pedestrian- and bike-only bridge.	As described in Chapter 2, *Program Description*, of the Draft EIR, an alternative was considered that would include removal of the Pope-Chaucer Bridge. That alternative, Alternative 11, Remove the Pope-Chaucer Bridge and Increase Capacity Downstream, was not carried forward for full analysis in the Draft EIR because the traffic impacts associated with bridge removal would not be consistent with the project's objective to minimize community impacts, including potential delays in emergency response times in this area. Replacing the Pope-Chaucer Bridge with a pedestrian and bike-only bridge would trigger the same or similar traffic impacts as removal of the Pope-Chaucer Bridge as envisioned under Alternative 11, therefore it would not be consistent with the project's objective to minimize community impacts.
I5	1	Nancy Yamada	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment states that a tree on their property is next to the cinderblock wall, and asks why a tree is not included in Appendix B of the Draft EIR.	Additional information regarding trees that may be removed during construction has been added to the Final EIR in Table 3.3-7, pages 3.3-78 to 3.3-82, and Figures 1 to 3 in Appendix B, showing potential tree removal locations.
I6	1	Joe McWesley	N/A	The comment provides support for the project.	The commenter's support for the project is noted.
I6	2	Joe McWesley	N/A	The comment asks if the creek bed could be used as a temporary truck route during construction.	The creek bed will be utilized for construction vehicles and materials. The creek is not a transportation corridor and cannot be converted to such over an extensive length.
I7	1	Chandra Permaul Nicola	N/A	The comment suggests having designated bike lanes on the new Pope-Chaucer Bridge.	Bicycle lanes are planned to be included in the design of the new bridge.
I8	1	Kay Harrison	3.8-32 – 3.8-33	The comment asks what erosion management would be included in the project.	To reduce project-related impacts to soil erosion and loss of topsoil, the Draft EIR provided mitigation (MM-HWR-1), which requires SFCJPA to prepare and implement an Adaptive Management Plan that would require monitoring and adaptive management to identify and address potential accelerated erosion at

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					flow rates over 5,800 cfs. To clarify the requirements of the Adaptive Management Plan, the Final EIR revises MM-HWR-1 to include a more detailed list of components that the Plan must include. The revisions also clarify SFCJPA's responsibilities in the case that accelerated erosion is identified under the Plan during project operation.
I9	1	Jeff Prudhomme	N/A	The comment asks if a construction schedule, including details about excavation and foundation, can be provided.	These construction details will be developed as part of the final design.
I10	1	Susan Glendening	N/A	The comment states that the Draft EIR needs more figures depicting the different treatments that will affect the creek.	The Draft EIR contains the information and materials required under CEQA. Additional figures and depictions of the alternatives considered were shared with the community at several public meetings during the scoping and public review periods. The presentation from public meetings is found on sfcjpa.org
I11	1	Dorian West	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment requests that a specific plan for individual tree removal be included, in order to properly assess how impacts to trees would be minimized.	Additional information regarding trees that may be removed during construction has been added to the Final EIR in Table 3.3-7, pages 3.3-78 to 3.3-82, and Figures 1 to 3 in Appendix B, showing potential tree removal locations. Table 3.3-7 shows the trees that are expected to be removed at each site. As discussed in the Draft EIR, implementation of MM-BIO-12 and MM-BIO-13 would reduce project-related impacts on protected trees to a less-than-significant level. MM-BIO-13 includes preparation of a tree protection plan by a licensed arborist, among other measures.
I11	2	Dorian West	2-7 – 2-10	The comment states that Pope-Chaucer Bridge should allow a pedestrian and bike activity as the primary form of traffic.	Sidewalks and bike lanes will be included in the design of the bridge. The SFCJPA has concluded that it is not feasible to remove vehicular traffic from the bridge. As described in Chapter 2, *Program Description*, of the Draft EIR, an alternative was considered that would include removal of the Pope-Chaucer Bridge. That alternative, Alternative 11, Remove the Pope-Chaucer Bridge and Increase Capacity Downstream, was not carried forward for

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					full analysis in the Draft EIR because the traffic impacts associated with bridge removal would not be consistent with the project's objective to minimize community impacts, including delays in emergency response times in this area. See pages 2-7 and 2-10 of the Draft EIR.
I11	3	Dorian West	N/A	The comment states that access to the creek should be more passable due to construction activities.	The project seeks to enhance recreational opportunities, but does not include creek channel access as a primary objective.
I12	1	Lennard Hachmann	N/A	The comment provides support for the project.	The commenter's support for the project is noted.
113	1	Steven Van Jepmond	N/A	The comment provides support for the project.	The commenter's support for the project is noted.
I14	1	Stephen Kerman	N/A	The comment states that the visuals provided at the May 23, 2019, public hearing should be included in the EIR or readily available on-line.	The presentation from the public meeting on the Draft EIR is available at sfcjpa.org.
I15	1	Xenia Hammer	N/A	The comment provides support for the project.	The commenter's support for the project is noted.
I16	1	Jim Fehrle	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment asks how many trees will be removed and where the trees are located as a result of the Pope-Chaucer Bridge.	Additional information regarding trees that may be removed during construction has been added in the Final EIR to Table 3.3-7, pages 3.3-78 to 3.3-82, and to Figures 1 to 3 in Appendix B, showing potential tree removal locations.
I16	2	Jim Fehrle	N/A	The comment states that there is a proposal to build a very large housing development on or near Euclid Avenue near the project site.	The SFCJPA is aware of this proposed development. Although preliminary community outreach has occurred, the housing project has not reached the level of planning that would require its consideration under CEQA. If that project moves forward within our planned construction timeline, it will be required to evaluate cumulative impacts. The SFCJPA will coordinate its construction activities with the cities, particularly around other projects occurring at the same time.

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I17	1	Sandy Lee	N/A	The comment states that any eucalyptus trees removed as a result of the project should be replaced with new eucalyptus trees.	Tree removal and subsequent replanting of tree species will be considered by SFCJPA and discussed with each city according to their ordinance. The SFCJPA will preserve as many existing eucalyptus trees as possible to maintain habitat for bees and other animals. Replanting will focus on native trees.
I18	1	William Ellsworth	N/A	The comment questions how the proposed design for the Pope-Chaucer Bridge will be able to account for debris flow in a flood event.	The distance between the bridge piers (34 feet) will allow debris to pass through during flood events.
I18	2	William Ellsworth	N/A	The comment asks if an alternative bridge design without piers in the channel were considered.	An alternative design without piers in the channel was considered. However, this design was not advanced because it would have required a thicker bridge deck and thus raised the elevation of road surface, resulting in greater impacts to the grades of Pope and Chaucer Streets, Woodland and Palo Alto Avenues, and private homes in the area.
I19	1	Meihong Wang	N/A	The comment asks whether, after 70-year flood protection is completed, the homes in the Crescent Park neighborhood will be located outside of the 100-year flood zone according to the definition provided by FEMA.	The floodplain area will be significantly reduced by the project. In order to remove all properties from the FEMA floodplain and flood insurance requirements, the SFCJPA plans to analyze what additional measures, such as constructing one or more upstream detention basins and, in certain areas, adding freeboard required by FEMA, would be needed.
I20	1	Bruce McCaul	N/A	The comment provides support for Alternative 2 and notes that there is a retaining wall in the creek channel that is being undercut.	The commenter's support for Alternative 2 is noted. This comment does not raise a specific issue on the substance of the Draft EIR.
I21	1	Naomi Goodman	N/A	The comment provides support for the project.	The commenter's support for the project is noted.
I21	2	Naomi Goodman	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment states that the removal of vegetation 250 feet upstream and downstream of the Pope-Chaucer Bridge would have a significant impact as there are at least 12 mature oak trees and one laurel tree along this stretch of the creek.	Additional information regarding trees that may be removed during construction has been added to the Final EIR in Table 3.3-7, pages 3.3-78 to 3.3-82, and Figures 1 to 3 in Appendix B, showing potential tree removal locations. The SFCJPA will preserve as many existing trees as possible, and tree removal and subsequent replanting of trees will be discussed with each city according to its ordinances.

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I21	3	Naomi Goodman	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment states that the Draft EIR should identify which trees would be removed as a result of project construction. The comment also states that volunteer organizations that have been removing invasive vegetation and replanting it with native vegetation should be consulted.	Additional information regarding trees that may be removed during construction has been added to Table 3.3-7, pages 3.3-78 to 3.3-82, and Figures 1 to 3 in Appendix B, showing potential tree removal locations, have been added to the Final EIR. The SFCJPA regularly partners with local volunteer organizations and will continue to do so as the project progresses toward final design and construction.
I21	4	Naomi Goodman	3.3-102 – 3.3-105	The comment states that the Draft EIR does not include a species inventory that would be impacted by vegetation removal along the creek and that there is a red-shouldered hawk nest within 500 feet of the Pope-Chaucer Bridge.	Impact BIO-10, page 3.3-102 to 3.3-105 in the Final EIR discusses protection of nesting birds and raptors that could occur in the project area. A preconstruction nesting survey will be performed to identify nests in the construction area (MM-BIO-23). If nesting birds are found, an appropriate buffer will be established in order to prevent disturbance to nests (MM-BIO-24). A biologist will be on site to monitor active nests during construction to ensure there is no disturbance to nesting birds (MM-BIO-24).
I21	5	Naomi Goodman	N/A	The comment states that diversion structures around the bridge pilings should be included in the design to protect the bridge from debris floating down the creek in a flood event.	The new bridge design currently includes 34 feet between the piers, which would not result in blockage for typical debris that moves downstream. All project features including the new bridge will be monitored for performance and appropriate maintenance activities will be prescribed as needed.
I21	6	Naomi Goodman	N/A	The comment states that alternatives that include flood walls along the creek should not be included in the project.	As required by CEQA, a range of reasonable alternatives to the project were analyzed in the EIR, including Alternative 5, *Replace the Pope-Chaucer Bridge and Construct Floodwalls Downstream*. The analysis of this alternative, as it compares to the proposed project, has been included in the Draft EIR and will be included in the Final EIR, as the lead agency considers this a feasible alternative. The inclusion of this alternative does not, however, in any way obligate the lead agency to select or construct this (or any) alternative to the proposed project.

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I21	7	Naomi Goodman	3.13-10	The comment states that construction activities would cause severe traffic impacts on the Willows residents. The comment suggests adding a temporary stop-light on Middlefield Road to improve traffic flow.	Impact TT-4 in the Draft EIR includes a discussion of potential traffic impacts (page 3.13-10). This impact discussion also includes MM-TT-1, which requires a temporary traffic signal at the intersection of Middlefield Road and Woodland Avenue in Menlo Park to address traffic impacts during construction and the closure of the Pope-Chaucer Bridge.
I22	1	Larry and April Alton	N/A	The comment states that any creek flood repairs should be paid for by the people who live in the flood zones, not the general public.	The EIR is intended to provide an assessment of the physical environmental impacts of the proposed project and alternatives. Project financing is outside of the purview of CEQA.
I23	1	Steve Eittreim	N/A	The comment suggests adding more parks or areas along the creek that would make it more accessible to the public.	The commenter’s support for maximizing the ecosystem and recreation improvements associated with the proposed project will be taken into account by decision-makers, in the context of the land use constraints in the project area such as roadways and private homes.
I24	1	Stephen Schooley	N/A	The comment suggests showing the assumptions and engineering calculations to demonstrate why the project is necessary as a way to build confidence with the public.	The comment does not identify a potential environmental impact within the scope of this EIR. However, modelling results and design parameters have been shared during public meetings during the scoping and public review periods.
I25	1	Hamilton Hitchings	N/A	The comment provides support for the project.	The commenter’s support for the project is noted.
I26	1	Linea Stewart	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment asks that the trees located along Woodland Avenue and Palo Alto Avenue not be removed as part of project construction.	Additional information regarding trees that may be removed during construction has been added to the Final EIR in Table 3.3-7, pages 3.3-78 to 3.3-82, and Figures 1 to 3 in Appendix B, showing potential tree removal locations. SFCJPA will continue to work to reduce the number of trees that will be removed in order to construct the project.
I27	1	Dhruv Khanna		The comment provides support for the project.	The commenter’s support for the project is noted.
I28	1	Jim Fehrle	2-23; 3.1-20 – 3.1-21	The comment notes that there is an inconsistency in the description of the amount	The description of the proposed extent of the rock slope protection (RSP) at the Pope-Chaucer Bridge has been revised on page 2-23 of the Final EIR. The

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				and location of rock slope protection (RSP) that would be incorporated as part of the project.	description now provided more accurately reflects the figures shown on pages 3.1-20 and 3.1-21.
I29	1	Jim Fehrle	2-18; Figure 2-6 / 2-22	The comment notes that there is an inconsistency in the amount of streambed vegetation that would be removed for construction activities.	The commenter is correct in that the description of removal of vegetation as described on page 2-16 of the Draft EIR is inconsistent with that shown on Figure 2-6. In addition, the footprint of the Pope-Chaucer Bridge construction activities has changed, affecting both the description and figure. The text on page 2-18 of the Final EIR has been revised to reflect that vegetation removal may occur up to 400 feet upstream and up to 350 feet downstream of Pope-Chaucer Bridge. Figure 2-6 on page 2-22 has also been revised to depict the current construction footprint.
I30	1	Steve Bisset	N/A	The comment provides support for the locally preferred alternative.	The commenter's support for the locally preferred alternative is noted.
I30	2	Steve Bisset	N/A	The comment provides opposition for the No-Build Alternative and Build Alternative 1.	The commenter's opposition to the No-Build Alternative and Build Alternative 1 are noted. CEQA requires the evaluation of a reasonable range of alternatives to the proposed project that feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or most of the significant effects. Per CEQA Guidelines Section 15126(e), a No-Project Alternative must be evaluated among the identified project alternatives. The impacts of all alternatives selected for full analysis based on the screening process described in Chapter 2, *Program Description*, of the EIR, are analyzed throughout Chapter 3, *Environmental Analysis*.
I30	3	Steve Bisset	N/A	The comment expresses support for Alternative 2 (the preferred alternative).	The commenter's support for the preferred project is noted.
I30	4	Steve Bisset	N/A	The comment expresses opposition to Build Alternative 3 and Build Alternative 4.	The commenter's opposition to Build Alternative 3" and "Build Alternative 4" is noted.
I30	5	Steve Bisset	N/A	The comment states that the commenter has read the entire Draft EIR.	This comment does not raise a specific issue on the substance of the EIR.

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I30	6	Steve Bisset	N/A	The comment commends the SFCJPA on their work, specifically surrounding the Pope-Chaucer Bridge and upstream retention basins at Searsville Dam.	This comment does not raise a specific issue on the substance of the EIR.
I31	1	Jerry Hearn	N/A	The comment notes that the commenter attended a public hearing for the Draft EIR.	This comment does not raise a specific issue on the substance of the EIR.
I31	2	Jerry Hearn	N/A	The comment provides support for the Locally Preferred Alternative.	The commenter's support for the locally preferred alternative is noted.
I31	3	Jerry Hearn	2-9 – 2-10	The comment asks why the Pope-Chaucer Bridge bypass alternative was eliminated and would like the reasoning to be provided in the response to comments.	The commenter's reference to the Pope-Chaucer Bridge bypass alternative appears to reference Alternative 7, *Develop a Bypass around the Pope-Chaucer Bridge and Increase Capacity Downstream*. As described in the Chapter 2, *Program Description*, this alternative would include construction of a culvert for bypassing flows to one side of the existing Pope-Chaucer Bridge. As noted in Table 2-1, *Screening of Alternatives*, *Based on each Alternative's Ability to Meet Project Objectives*, this alternative was not advanced for feasibility screening because diverting water around the existing bridge would not improve the creek's hydraulic function and would be inconsistent with the project's objective to enhance habitats. CEQA Guidelines Section 15126.6(c) requires that an EIR *briefly* describe the rationale for selecting the alternatives to be discussed, and identify any alternatives that were considered by the lead agency but rejected as infeasible during the scoping process, and *briefly* explain the reasons underlying the lead agency's determination.
I31	4	Jerry Hearn	N/A	The comment notes that the commenter was unable to locate information in the Draft EIR concerning how the proposed widening sites and bridge replacement would interact under current conditions, and when sediment loads are released behind Searsville dam.	The elements that make up the proposed project would be built in a reach of the creek that is stable and does not experience significant channel aggradation or degradation. Sediment modeling shows that Stanford's proposed action at Searsville Dam will not change this dynamic in the reach of the SFCJPA's proposed project features.

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I31	5	Jerry Hearn	N/A	The comment questions why natural bank treatments or natural stabilization elements were not incorporated into the proposed project.	Natural bank stabilization and riparian restoration are incorporated where possible. The design of the project features will be further refined during the permitting phase.
I31	6	Jerry Hearn	Figure 3.3-4 / 3.3-71	The comment suggests using only California native tree species to replace the trees that are removed as part of project construction activities.	Native tree species will be used as much as possible to replace any trees removed along the creek. Figure 3.3-4, page 3.3-71, shows riparian plantings will be planted above the project site, in addition to invasive plant removal.
I31	7	Jerry Hearn	1-6 – 1-7; 3.8-41 – 3.8-4	The comment states the Stanford has recently provided the public with more information about utilizing Searsville dam as a retention basin and that this information should be included in the Final EIR.	As described in Chapter 1, *Introduction*, of the Draft EIR, the SFCJPA is working with Stanford University to enable the implementation of a Stanford project at Searsville Dam. Should Stanford University decide not to pursue the project at Searsville by the time SFCJPA implements its project in Reach 2, SFCJPA may pursue the implementation of one or more detention basins in other locations on University property. Section 3.8, *Hydrology*, of the Draft EIR discusses the cumulative impacts related to sediment and hydrology of construction both that project and SFCJPA's preferred project (pages 3.8-41 to 3.8-42 of the Final EIR).
I31	8	Jerry Hearn	N/A	The comment states opposition to using the Former Nursery and Webb Ranch Sites due to the amount of soil disturbance, stream impacts, retention abilities, and impacts to the existing uses at these sites.	The Draft EIR analyzes the potential impacts associated with construction of the detention basins at a programmatic level. Implementation of one or more of these projects would require detailed engineering design and subsequent environmental analysis of potential impacts associated with soil disturbance/removal and construction of inlet and outlet structures.
I31	9	Jerry Hearn	N/A	The comment states that the financial, social, and environmental costs of offline detention basins outweigh the potential benefits.	This EIR analyzes offline detention basins as alternatives at a programmatic level. Should a detention basin alternative warrant further investigation in the future, a detailed analysis of the costs, impacts and benefits will be conducted.
I31	10	Jerry Hearn	N/A	The comment notes that the Webb Ranch Site does not include what will be done with soil	The excavated material from the Webb Ranch site would be loaded onto trucks for hauling to an offsite

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				removed during construction at this site. The comment states that this information should be included in the Final EIR.	location for reuse or disposal. As that alternative has been evaluated only at a program level of detail, disposal sites for soil removed from this location have not been identified.
I31	11	Jerry Hearn	2-37	The comment notes that the wording in the paragraph of the *Web Ranch Detention Basin Alternative Construction* section is confusing. The comment notes that "Former Detention Basin" should be changed to "Former Nursery Detention Basin" to minimize confusion.	The text in paragraph 6, page 2-37, has been revised in the Final EIR from "Former Detention Basin" to "Former Nursery Detention Basin."
I31	12	Jerry Hearn	N/A	The comment notes that the City of Palo Alto has allowed the Buckeye Creek's channel to develop naturally to allow for some flow attenuation. The comment states that perhaps there are other ways to augment the proposed upstream detention options detailed in the Draft EIR.	The SFCJPA will continue to investigate creative methods for upstream attenuation, including partnering with the City of Palo Alto on a future project along Buckeye Creek.
I31	13	Jerry Hearn	N/A	The comment provides support for the proposed channel widening approach and some hesitation for the Pope-Chaucer bridge replacement.	The commenter's support for the channel widening approach and hesitation for the bridge replacement is noted.
I32	1	Tiffany Souza	N/A	The comment expresses concern over the impacts to trees as a result of project construction and provides opposition to the project.	The commenter's concern regarding impacts to trees and opposition to the project is noted.
I32	2	Tiffany Souza	N/A	The project expresses concerns over the impacts to traffic and circulation to the communities of Menlo Park, Atherton, East Palo Alto, and Redwood City as a result of project construction.	The commenter's concerns regarding traffic and circulation are noted. This comment does not raise a specific issue on the substance of the Draft EIR.
I33	1	Larry Rockwell	N/A	The comment provides support for the work that SFCJPA has done for the project over the past 20 years. The comment also notes that San Francisquito Creek is a special resource that must be preserved.	This comment expresses support for SFCJPA, and notes the importance of the project. This comment does not raise a specific issue on the substance of the EIR.
I33	2	Larry Rockwell	N/A	The comment provides support for Alternative 1 and Alternative 2.	The commenter's support for Alternative 1 and Alternative 2 is noted.

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I33	3	Larry Rockwell	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment asks for more information regarding which trees are proposed for removal and confirmation that as few trees as possible will be removed.	Impacts to trees are discussed in Section 3.3, *Biological Resources*, pages 3.3-78 to 3.3-82, which also includes mitigation measures to protect and replace trees. Additional information regarding trees that may be removed during construction has been added to the Final EIR in Table 3.3-7, and Figures 1 to 3 in Appendix B, showing potential tree removal locations.
I33	4	Larry Rockwell	2-25; 3.13-6 – 3.13-7	The comment asks for more information regarding construction vehicles, and equipment. The comment also expresses concerns regarding construction-period traffic, including mitigation requiring a temporary traffic signal on Woodland and Middlefield.	A general list of construction equipment anticipated for construction of the project is provided on page 2-25 of the Final EIR. More details about construction vehicles and equipment is not available at the level of design that was used to inform the Draft EIR, and therefore has not been included. These construction details will be developed as part of the final design. The commenter's concerns regarding traffic impacts are noted. Impact TT-1 in the Draft EIR includes a discussion of potential traffic impacts. This impact discussion also includes MM-TT-1, which requires a temporary traffic signal at the intersection of Middlefield Road and Woodland Avenue to address traffic impacts during closure of the Pope-Chaucer Bridge. Approval of the project would commit the SFCJPA to implementing this mitigation measure, and approval by the City of Menlo Park would be required to install the temporary signal.
I33	5	Larry Rockwell	N/A	The comment states that the timing of the construction schedule is confusing, and asks if there are contingencies in place if construction takes longer than the anticipated schedule.	The Draft EIR states that the SFCJPA is working to enable construction to begin in 2020, but that given the complexities and uncertainties associated with permitting and funding this project, construction may not begin until 2021. These construction details will be developed as part of the final design. Specifically with respect to replacement of the Pope-Chaucer Bridge, the SFCJPA believes that bridge construction can be completed within the anticipated 9-month construction window, which includes some contingency. Other schedule contingencies may be

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					considered during final design prior to award of a construction contract.
I34	1	Jeffrey Shore		The comment states that there are inconsistent statements regarding the completion of the detention project in Reach 3, and asks whether or not that project is going to happen.	Upstream detention is evaluated at a programmatic level in this Final EIR, and to advance to project approval and construction, requires further environmental review.
I34	2	Jeffrey Shore	N/A	The comment states that there are inconsistencies regarding whether a sheet-pile wall or soil-nail wall would be constructed at Site 5. Additionally, the comment notes that the type and reasoning for the retaining wall to be used at Site 5 needs to be incorporated.	The SFCJPA is currently refining the design of the wall at the channel widening sites, and for the purposes of this EIR, the construction scenarios with the greatest impacts were assumed.
I34	3	Jeffrey Shore	N/A	The comment states that more information on the existing conditions immediately upstream of West Bayshore Road at Site 5 is needed to adequately describe current conditions at Site 5.	Detailed information about hydraulic conditions can be obtained by contacting SFCJPA staff. This level of detail is not required under CEQA.
I34	4	Jeffrey Shore	3.1-10; 3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment states that more information on the existing trees at Site 5 needs to be included, specifically, where the trees are located and which provide natural screening.	As described on page 3.1-10 of the Draft EIR, vegetation along this portion of the creek is not very dense, and views of Site 5 are available from the building on West Bayshore Road and between gaps in the sound walls along U.S. 101. However, fencing and landscaping block views from the residences. There are no scenic views associated with this site, and the project would not cause substantial degradation of the visual character or quality of the project site or its surroundings. Section 3.3, *Biological Resources*, also describes existing vegetation within the project footprint and analyzes impacts to trees throughout the project area resulting from the project. As required by MM-BIO-13, *Protect trees from construction impacts*, a number of steps would be taken at Sites 1, 3, 4, and 5 to reduce impacts on trees and maintain their health and vitality. This mitigation measure includes preparation of a detailed arborist report, including an inventory of existing trees and a plan for protecting trees that could

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					be affected by project construction. See also response to comment A2-16, regarding visual impacts at Site 5. Additional information regarding trees that may be removed during construction has been added to the Final EIR in Table 3.3-7, pages 3.3-78 to 3.3-82, and Figures 1 to 3 in Appendix B, showing potential tree removal locations. Top of bank trees not located within of the top of bank widening footprint from West Bayshore Road to approximately 80 feet upstream of West Bayshore Road will be protected in place whenever possible.
I34	5	Jeffrey Shore	N/A	The comment notes that it is confusing whether the proposed retaining wall (soil-nail wall or sheet-pile wall), would replace the existing cinderblock floodwall at Site 5 entirely, or if it would just supplement the existing wall. Additionally, the comment states that more details on the proposed excavation activities and construction setbacks at Site 5 should be provided in the document.	At the location of greatest widening, adjacent to the West Bayshore Bridge, Site 5 top of bank will be widened from approximately 90 feet (existing width) to approximately 120 feet. Top of bank widening tapers back to conform with existing top of bank approximately 80 feet upstream of West Bayshore Road. The existing top of bank floodwall will be replaced by sheet pile wall from West Bayshore Road to approximately 400 feet upstream of West Bayshore Road. The new sheet pile will be located consistent with the new top of bank in the widened area from West Bayshore Road to approximately 80 feet upstream. The new sheet pile wall from 80 feet to approximately 400 feet upstream of West Bayshore Road will be installed along the alignment of the existing floodwall. The SFCJPA will review design plans and discuss any concerns with adjacent homeowners prior to construction.
I34	6	Jeffrey Shore	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment states that impacts to trees and views from excavation of existing bank materials and construction of a sheet-pile wall or soil-nail wall at the top of the bank need to be incorporated.	Additional information regarding trees that may be removed during construction has been added to the Final EIR in Table 3.3-7, pages 3.3-78 to 3.3-82, and Figures 1 to 3 in Appendix B, showing potential tree removal locations. Impacts to trees are also discussed in Section 3.1, *Aesthetics*, which states that upon project completion, street trees and other vegetation, including at the bottom and tops of banks, would be

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					replanted with native species. The EIR notes that although shrubs and groundcovers would grow rather quickly, it will take several years before planted trees would be mature enough to provide the same type of aesthetic character as some of the trees that would be removed, which may be perceived negatively.
I34	7	Jeffrey Shore	N/A	The comment states that the Draft EIR needs to be revised to identify all potential environmental impacts at Site 5.	The potential environmental impacts at Site 5 are currently identified and discussed in Chapter 3 of the EIR. For additional information related to specific impacts, see the responses to comments I34-2, I34-3, I34-4, I34-5, and I34-6.
I35	1	Peter Joshua	N/A	The comment states that at the public meetings, information about the upstream detention basins and Searsville Dam were met with limited responses and notes that the upstream detention basin would be the least impactful to the community and would have prevented prior floods.	The project proposes actions that can be taken in the near term to reduce flooding in the area of greatest risk. Upstream detention alone cannot meet the SFCJPA's overarching objective of protecting against a 100-year storm event, and it could achieve the protection afforded by the proposed project only if after the Webb Ranch *and* Former Nursery Detention Basins *and* the Searsville Dam and Reservoir were all constructed. Upstream detention alternatives were discussed using the information available to the SFCJPA at this time, and the SFCJPA will seek additional information to further evaluate these alternatives.
I35	2	Peter Joshua	2-18; Figure 2-6 / 2-22	The comment states that more information on the analysis regarding the structure and implementation of the Pope-Chaucer Bridge replacement needs to be included in the document or made available to the public.	The analysis in the Draft EIR is based on a preliminary level of design of the Pope-Chaucer Bridge. This level of design is sufficient to allow for a complete environmental analysis and identification of mitigation for potential environmental impacts, and therefore is appropriate for an EIR. Note that the construction footprint for replacement of the Pope-Chaucer Bridge has been refined since the Draft EIR, and is reflected in the Final EIR (see the text on page 2-18 of the Final EIR and Figure 2-6 on page 2-22).When available, additional design details will be presented to the cities and residents.

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I35	3	Peter Joshua	N/A	The comment notes concern over the cost and budget of the project.	This comment does not address an issue on the substance of the Draft EIR.
I36	1	Carolyn Westgaard	N/A	The comment provides support for the Locally Preferred Alternative.	The commenter’s support for the locally preferred alternative is noted.
I37	1	Susan Mittman	N/A	The comment provides support for the Locally Preferred Alternative.	The commenter’s support for the locally preferred alternative is noted.
I38	1	Jay and Sallie Whaley	N/A	The comment provides support for the project.	The commenter’s support for the project is noted.
I39	1	Jim Wiley	N/A	The comment provides a summary of the information enclosed in the letter.	This comment does not address an issue on the substance of the Draft EIR.
I39	2	Jim Wiley	N/A	The comment summarizes previous work that was done on the Creek banks near the 1200 Woodland Avenue property in Menlo Park.	This comment does not address an issue on the substance of the Draft EIR.
I39	3	Jim Wiley	N/A	The comment states that the Draft EIR does not adequately analyze the impacts of increasing the Creek flow on the potential for erosion of Creek banks. The comment also notes that there appears to be something wrong in the velocity model calibrations.	The analysis of impacts of increasing creek flow on the potential for erosion of creek banks is based on the results of hydraulic modeling of existing conditions and the projected post-project conditions by the Santa Clara Valley Water District using a model validated by the U.S. Army Corps of Engineers. As shown in Table 3.8-5 of the Draft EIR, flow velocities under existing conditions in areas downstream of the Pope-Chaucer Bridge are currently subject to erosion ranging from 5.82 to 8.15 feet per second at the maximum flow that is currently able to pass under the Pope-Chaucer Bridge (5,800 cubic feet per second). The results of the hydraulic model estimate that under with-project conditions, flow velocities will increase from 0.37 to 1.06 feet per second (5 to 13 percent) at all locations except for Site 11, which would experience a decrease in potential velocity of 0.62 feet per second. To mitigate the potential impacts of increased flow velocities during peak storm events, the EIR includes MM HWR-1, which requires the SFCJPA to assess the erosion identified monitoring sites following storm events

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					exceeding 5,800 cubic feet per second and, if needed, implement appropriate erosion control measures.
I39	4	Jim Wiley	N/A	The comment states that the increase in Creek flow associated with maximum flood waters poses a significant risk of causing bank failure and that these impacts could be mitigated by engineered toe reinforcements.	As described in the response to comment I39-3, the SFCJPA will assess the erosion monitoring sites identified in the EIR following storm events exceeding 5,800 cubic feet per second and, if needed, implement appropriate erosion control measures.
I40	1	Libby Lucas	N/A	The comment notes that it is important to incorporate and analyze the recent tree loss and erosion that has occurred in Reach 3 between Interstate 280 and Arastradero Road and the changes in hydrology of Los Trancos Creek.	The proposed project will neither reduce nor increase erosion in the area of Reach 3 close to Interstate 280, which is several miles upstream of Reach 2. The movement of debris and sediment emanating from Reach 3 will be improved by the proposed project.
I40	2	Libby Lucas	N/A	The comment states that the changes to the Creek that have been made by Stanford University have affected the Creek's flow meander and trees resiliency to withstand stream surges and that this information needs to be included in the Draft EIR, along with adjustments or mitigation measures to lessen these impacts.	Creek conditions that are the result of actions taken by other parties that pre-date a proposed project are considered existing conditions. Modification of existing conditions outside of a proposed project's footprint and not related to its objectives are not required under CEQA.
I40	3	Libby Lucas	3.3-107	The comment expresses concern over impacts to a colony of California tiger salamanders at Lake Lagunita and asks whether the fish ladder and pump station operated by Stanford University are impacting these endangered species.	Stanford's existing facility at Lake Lagunita was not specifically analyzed in this EIR. However, the impacts of impacts of Stanford's project on California tiger salamanders are considered in conjunction with the project's impacts on this species as part of the cumulative impact analysis. The presence of this species at Lake Lagunita is discussed on page 3.3-107 of the Final EIR.
I41	1	Ben Ball	N/A	The comment notes that the commenter owns property at 1491 Edgewood Drive and would be impacted by activities at Site 4, and lives at 1425 Edgewood Drive and would be impacted by activities at Site 3.	This comment does not raise a specific issue on the substance of the Draft EIR.
I41	2	Ben Ball	N/A	The comment asks for more information and clarification regarding the bank measurements taken for the project.	The SFCJPA has initiated contact with individuals whose property is located within the construction footprint.

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I41	3	Ben Ball	N/A	The comment asks for more information and clarification regarding the creek bank measurements taken for the project.	As stated in Chapter 2, *Program Description*, the bank would be set back 2 to 18 feet at Site 4, meaning it would be moved back from the top of bank by 2 to 18 feet so that the creek would be widened to accommodate increased flow. The SFCJPA has initiated contact with individuals whose property is located within the construction footprint.
I41	4	Ben Ball	N/A	The comment asks if the proposed Creekside park at Ramp 4 has been considered as a space for parking, as well. The comment also provides opposition to the creation of the Creekside park #2.	Creekside parking has not been considered in this EIR, as increasing parking is not an objective of the project. The comment in opposition to Creekside park #2 is noted.
I41	5	Ben Ball	N/A	The comment asks if there will be additional public meetings, and if there is a way to access the information and materials presented in the previous public hearings.	Three public meetings were held for the proposed project. Information on the public meetings was provided prior to the meetings and at sfcjpa.org. The presentation from the public meeting on the Draft EIR is available at sfcjpa.org.
I42	1	Jeff Prudhomme	N/A	The comment expresses opposition to allowing construction trucks and equipment access the creek across from 935 Woodland Avenue and the impacts that will be imposed on nearby residents.	All reasonable efforts will be taken to reduce impacts to the community during construction of the project. All access ramps will be located to minimize total impacts to the creek and residents.
I42	2	Jeff Prudhomme	N/A	The comment expresses concerns and provides suggestions regarding the ramp that would be used to access the Creek.	While the commenter does not name the ramp that referenced in the comment, it is presumed that the reference is to Access Ramp 2 adjacent to Woodland Avenue. As described in Chapter 2, *Program Description*, access ramps would be re-established through vegetation removal and grading to allow vehicles to enter the channel. The access ramps would be revegetated after use with appropriate native plant species.
I42	3	Jeff Prudhomme	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3	The comment states that the trees proposed to be removed along the creek bank should be mapped so that nearby residents can easily identify them and provide input.	Additional information regarding trees that may be removed during construction has been added to the Final EIR in Table 3.3-7, pages 3.3-78 to 3.3-82, and Figures 1 to 3 in Appendix B, showing potential tree removal locations.

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I43	1	Kay Harrison		The comment notes that a comment letter was submitted in addition to an email.	See the response to comment I8-1.
I44	1	Tate and Curtis Snyder	N/A	The comment states that replacement of the Pope-Chaucer bridge will impose significant impacts on the surrounding residents and that these impacts have not be analyzed and addressed properly.	The impacts of replacement of the Pope-Chaucer Bridge as part of the preferred project have been analyzed throughout the EIR The EIR includes substantial evidence, as defined in CEQA Guidelines Section 15384, to support the conclusions contained therein.
I44	2	Tate and Curtis Snyder	2-7 – 2-10	The comment supports the removal of the existing bridge and not replacing it as the least impactful alternative.	As discussed in Chapter 2, *Program Description*, of the Draft EIR, the alternative that would include removal of the Pope-Chaucer Bridge (Alternative 11) was eliminated from further consideration as part of the alternatives screening process because the traffic impacts of bridge removal would not be consistent with the project's objective to minimize community impacts, including delays in emergency response times in this area. See the response to comment A4-29 for further discussion regarding the requirements for an EIR's analysis of a reasonable range of alternatives.
I44	3	Tate and Curtis Snyder	N/A	The comment states that there should be a definitive agreement between Stanford and the SFCJPA for the construction of upstream detention basins before the EIR can be certified.	A written agreement with Stanford is not required in order to certify this Final EIR. Because upstream detention is needed to achieve the SFCJPA's overarching objective of protecting against a 100-year event, the SFCJPA is working with Stanford to analyze that potential project.
I44	4	Tate and Curtis Snyder	N/A	The comment states that the proposed design of the Pope-Chaucer Bridge is significantly oversized and would impact the surrounding sensitive environmental setting and residents.	The roadway width of a new Pope-Chaucer Bridge would not exceed the width of the roadway on the current bridge. Furthermore, the proposed bridge will daylight a significant portion of creek channel, providing for improved stream function and habitat. Impacts to residents and the environmental setting will be minimized to the extent possible.

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I44	5	Tate and Curtis Snyder	N/A	The comment states that the proposed location of the construction ramp would impose unacceptable negative impacts on Woodland Avenue and residents.	The SFCJPA has initiated contact with individuals whose property is within the construction footprint. Impacts to residents will be minimized to the extent possible, through both the project design and the implementation of mitigation measures related to traffic, including safety issues related to construction vehicle traffic. See responses to comments A 2-12, A 2-27, and PH 1-11, regarding MM-TT-2, which requires a traffic control plan be developed and implemented during project construction. As required by MM-TT-2, a site-specific traffic control plan under the oversight of a licensed traffic engineer to minimize the effects of construction traffic on surrounding roadways. Among the requirements included in the plan would be to provide 72-hour advance notification to affected residents or businesses if access to driveways or private roads will be affected or limit effects on driveway and private roadway access to working hours and ensure that access to driveways and private roads is uninterrupted during non-work hours The plan also would include specific measures such as installation of fences, barriers, lights, flagging, guards, and signs, as determined appropriate, to give adequate warning to the public of the construction and potential dangerous conditions to be encountered as a result thereof. MM-TT-2, along with MM-TT-1, which requires a temporary traffic signal at the intersection of Middlefield Road and Woodland Avenue, would help to maintain emergency vehicle access by regulating and maintaining the flow of traffic. As noted in Section 3.1, *Aesthetics*, while the presence of construction material, equipment, workers, and other associated improvements would alter the existing visual environment, all project alternatives and elements would implement a series of best management practices during construction to

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					minimize impacts to the visual and aesthetic environment.
I44	6	Tate and Curtis Snyder	3.2-24	The comment states that mitigation measures, such as retrofitting nearby homes with noise-reducing glazing in order to mitigate noise and windblown dust and debris from construction activities, should be incorporated.	The Draft EIR concludes that construction noise cannot be fully mitigated, and the impact would be significant and unavoidable. As such, the Draft EIR appropriately discloses the impacts that would result from construction activities, and recommends mitigation to minimize impacts to the extent feasible. While the noise from such construction would exceed the levels determined to be acceptable by local jurisdictions, this noise would cease upon completion of construction. The commenter's suggestion to install noise-reducing glazing on windows of adjacent homes may have a limited benefit to individual residents, but would not be sufficient to avoid a significant impact under CEQA. With respect to windblown dust and debris, as stated in the Draft EIR, implementation of MM-AQ-4 would reduce construction-related fugitive dust impacts during all phases of construction to a less-than-significant level.
I44	7	Tate and Curtis Snyder	N/A	The comment notes that a detailed construction schedule must be included in the Draft EIR.	A detailed construction schedule is not required under CEQA. This schedule will be developed and communicated to the public later in the design process.
I44	8	Tate and Curtis Snyder	N/A	The comment notes that an economic analysis of the short- and long-term impacts of the project on home values near the project should be included in the Draft EIR.	The primary objective of the project is to reduce risk to people and property along the Creek channel. CEQA requires an analysis of the physical impacts of a project on the environment. Per CEQA Guidelines Section 15131, "economic or social effects of a project shall not be treated as significant effects on the environment…the focus of the analysis shall be on the physical changes." Economic or social effects of a project may only be considered significant impacts if physical effects may be directly traced back to such effects. Economic and social effects also may be considered by the lead agency in determining the

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					feasibility of a project alternative and in its decision to adopt a project despite a finding that the project would result in significant and unavoidable impacts.
I44	9	Tate and Curtis Snyder	N/A	The comment states that a "Citizens Advisory Council," compose of planners, historians, affected residents among others, should be formed to provide input on the design and implementation of any proposed replacements at the Pope-Chaucer Bridge.	This comment does not raise a specific issue on the substance of the EIR, nor is creation of an advisory committee required under CEQA.
I45	1	Robert Jones	N/A	The comment provides support for the project.	The commenter's support for the project is noted.
I45	2	Robert Jones	N/A	The comment suggests implementing an early warning system for times when the creek is about to flood, during the duration of project construction.	The SFCJPA has a flood early warning system, available through its website, sfcjpa.org, that utilizes real-time data from rain and stream flow gauges in the upper watershed (Reach 3), as well as creek monitors at bridges within Reach 2. Anyone wishing to receive text or email alert notifications from the flood early warning alert system should contact the SFCJPA at jpa@sfcjpa.org or 650-324-1972.
I46	1	William P. Parkin	N/A	The comment states the Draft EIR is inadequate and needs to be revised to address key issues, and then recirculated.	This comment constitutes an introductory statement to the remainder of the letter. This comment does not raise a specific issue on the substance of the Draft EIR.
I46	2	William P. Parkin	N/A	The comment states that the Draft EIR is supposed to be a Program EIR, but creates bias toward the alternatives in Reach 2 in comparison to other options in Reach 3 because more information is presented.	SFCJPA respectfully disagrees with the commenter's assertion that analyzing a No Project alternative, two alternatives within Reach 3 at a program level, and two alternatives within Reach 2 at a project level, "renders the choice of a Reach 2 alternative as a *fait accompli*." The provision of more detail about one alternative as compared to another does not bias approval of the alternative for which more detail is available. It merely increases the likelihood that subsequent environmental analysis would be required under CEQA to fully assess the impacts of the Reach 3 alternatives. Furthermore, it is customary and proper for an EIR to include more detail regarding the preferred, or proposed, project than regarding alternatives to that project. Per CEQA Guidelines

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					Section 15126.6(d), an EIR "shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project." If a later project is proposed that was analyzed at the program level, the lead agency will consider whether and to what degree additional environmental review is required consistent with Sections 15152 and 15168 of CEQA Guidelines.
I46	3	William P. Parkin	4.10-10 – 4.10-11	The comment states that the biggest error in the Draft EIR is that it makes the proposed project the environmentally superior alternative.	CEQA allows for a determination that the proposed project is the environmentally superior alternative. The commenter notes, and SFCJPA agrees, that the CEQA Guidelines state that if the No Project alternative is the environmentally superior alternative, the EIR must also identify another environmentally superior alternative. However, the Guidelines do not expressly state that the proposed project cannot be identified as the environmentally superior alternative. That said, Chapter 4, *Other CEQA-Required Sections*, pages 4-10 and 4-11, of the EIR has been revised to identify the Former Nursery Detention Basin Alternative as the environmentally superior alternative, because while it would be less beneficial than the proposed project, it would have fewer impacts as compared to the proposed project and the other alternatives to the project. As also described in Chapter 4, an agency's determination of the environmentally superior alternative does not preclude the selection of another alternative that better fulfills the project objectives. Pursuant to Sections 15091 and 15093 of the CEQA Guidelines, the SFCJPA, as lead agency, may adopt a statement of overriding considerations which expresses the agency's views on the merits of approving an alternative, including the proposed project, despite any significant adverse environmental impacts that may result. A statement of overriding considerations provides the justification for proceeding with a project despite its environmental

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					impacts, and reflects an agency's responsibility to balance the public's environmental, economic, social, legal, technological, and other interests.
I46	4	William P. Parkin	N/A	The comment states that CEQA requires agencies to adopt feasible alternatives to the proposed project when there are unavoidable impacts and that other alternatives provided in the Draft EIR provide less significant impacts.	Chapter 3, *Environmental Analysis*, of the Draft EIR, presents an analysis of the impacts of the proposed project, and where significant impacts are identified, mitigation measures are proposed to avoid, minimize, or reduce project impacts. Alternatives to the project that meet the project objectives also have been identified and analyzed in comparison to the proposed project throughout Chapter 3 of the Draft EIR. See also the responses to comments I46-2 and I46-3 regarding identification of the environmentally superior alternative and selection of a reasonable range of alternatives to the proposed project.
I46	5	William P. Parkin	4-10 – 4-11	The comment states that the environmental benefits of the environmentally superior alternative are not fully described or defined. Additionally, the comment states that since these benefits are not defined, agencies cannot adopt the proposed project because there are no demonstrated benefits that outweigh the project's significant and unavoidable impacts.	Pages 4-10 and 4-11 of the Draft EIR have been revised to identify the Former Nursery Detention Basin Alternative as the environmentally superior alternative, because while it would be less beneficial than the proposed project, it would have fewer impacts, as compared to the proposed project and the other alternatives to the project. As noted above in response to comment I46-5, and in Chapter 4 of the EIR, pursuant to Sections 15091 and 15093 of the CEQA Guidelines, the SFCJPA, as lead agency, may adopt a statement of overriding considerations which expresses the agency's views on the merits of approving an alternative, including the proposed project, despite any significant adverse environmental impacts that may result. A statement of overriding considerations provides the justification for proceeding with a project despite its environmental impacts, and reflects an agency's responsibility to balance the public's environmental, economic, social, legal, technological, and other interests.
I46	6	William P. Parkin	4-4 – 4-9	The comment states that the Draft EIR did not provide a reasonable range of alternatives	Per CEQA Guidelines Section 15626.6(a), "an EIR shall describe a range of reasonable alternatives to the

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				because the Reach 2 and Reach 3 projects are not separate alternatives.	project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives.” Section 16126.6(c) further states that “ the range of potential alternatives to the proposed project shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects.” CEQA does not specify how many alternatives constitute a “reasonable range.” The scope of alternatives comprising a reasonable range of alternatives will vary from case to case, depending on the nature of the project under review, and the lead agency has the discretion to determine how many alternatives will constitute a reasonable range. *See Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553; *San Franciscans for Livable Neighborhoods v. City & County of San Francisco* (2018) 26 Cal.App.5th 596; *Mount Shasta Bioregional Ecology Ctr. v County of Siskiyou* (2012) 210 Cal.App.4th 184. Following the screening of the 17 initial alternatives in Chapter 2, Section 2.6, Alternatives Screening, Alternative 3 within Reach 3 is separated into two alternatives, the Former Nursery Detention Basin Alternative and Webb Ranch Detention Basin Alternative. While Chapter 2, Program Description, of the EIR notes that these Reach 3 alternatives could be considered as a complement to the preferred project because some amount of upstream detention is required to meet the SFCJPA overarching objective of providing 100-year protection, ultimately, the detention basins are considered and evaluated throughout Chapter 3, Environmental Analysis, as alternatives to the proposed/preferred project. The two detention basin alternatives are also clearly identified as alternatives

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					to, and compared against, the proposed project, the Floodwalls Alternative, and the No Project alternative, in Chapter 4, Section 4.4, *Identification of the Environmentally Superior Alternative*. A reasonable range of alternatives has been analyzed.
I46	7	William P. Parkin	N/A	The comment asks why the Draft EIR did not consider or analyze a more extensive Reach 3 Alternative that would result in water retention benefits upstream during major storm events and habitat restoration.	A report commissioned by the SFCJPA and completed 2009 identified all detention sites in the upper watershed that could provide meaningful floodwater detention based on stream flow, topography and other technical requirements. Since that time, this information has been available on the sfcjpa.org website and was discussed at public meetings, including meetings in each city related to the development of this EIR. As described above, CEQA grants the lead agency discretion to determine what constitutes a reasonable range of alternatives to the proposed project. An EIR need not include multiple variations of the alternatives that it does consider. *Mira Mar Mobile Community v. City of Oceanside* (2004) 119 Cal.App.4th 477. As described in Chapter 2, *Program Description*, of the Draft EIR, alternatives were devised based on substantial stakeholder input and on their ability to meet the project objectives and reduce project impacts. While flood protection was identified as a primary objective of the proposed project, other objectives were also identified and considered in the identification of project alternatives. These include habitat enhancement, creation of new recreational opportunities and connections to existing bike and pedestrian corridors, and minimization of operational and maintenance requirements. As discussed above, the Reach 3 Alternatives are, in fact, analyzed throughout Chapter 3 of the EIR as alternatives to the project.
I46	8	William P. Parkin	N/A	The comment questions why the SFCJPA has not pursued a project that would incorporate the	As described in Chapter 1, *Introduction of the Draft EIR*, Stanford University is currently exploring a

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				Searsville Dam and Reservoir, and states that the Draft EIR needs to consider a Searsville Dam and Reservoir Alternative as part of the proposed project.	project to modify the Searsville Dam and Reservoir. Although the SFCJPA is working with Stanford University to enable implementation of a project at Searsville, that project would likely be implemented independently of the proposed project analyzed in the Draft EIR following the preparation of separate environmental documents and permit applications. Cumulative impacts of both projects were discussed within the Draft EIR, as required by CEQA.
I46	9	William P. Parkin	N/A	The comment notes that the Draft EIR does not consider transient aggradation of the channel that would result in reduced conveyance capacity as an impact of the project, but rather the result of a future project by another entity, and thus not requiring mitigation. The comment notes that this is further support for demonstrating that the Searsville Dam and Reservoir must be considered as an alternative.	The EIR considers potential impacts of the SFCJPA's proposed project and alternatives to it. Any project at the Searsville Dam and Reservoir would require its own project level CEQA documentation, which would analyze and mitigate for any impacts, including those related to transient sediment, resulting from that work.
I46	10	William P. Parkin	3.8-32 – 3.8-33	The comment states that the Draft EIR refers to MM-HWR-1 as a monitoring activity, and that this deferral of analysis of environmental impacts and consequential mitigation measures is illegal.	See response to comment A4-22 above.
I46	11	William P. Parkin	3.10-21	The comment states that MM NV-4 is a deferral of analysis of environmental impacts with respect to conducting vibration monitoring.	MM-NV-4 requires real-time monitoring of vibration levels at sensitive receptors and that construction be ceased if ground-borne vibration approaches or exceeds the level at which buildings could be damaged. No impact with respect to vibration would occur if construction is halted. Vibration monitoring would not constitute a deferral of analysis and mitigation, because a clear threshold has been defined, and the mitigation measure specifies that construction must immediately cease and cannot continue if ground-borne vibration exceeds that threshold.
I46	12	William P. Parkin	3.3-67	The comment states that MM-BIO-7 is a deferral of analysis of environmental impacts with respect to mitigation for sensitive habitats.	MM-BIO-7, page 3.3-67, requires that sensitive habitats be demarcated prior to disturbance and that all such areas be protected from encroachment and

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					damage, precluding damage to these habitats. This mitigation measure includes specific requirements for surveying and demarcating sensitive habitats and specific measures for protecting that habitat from damage, and therefore does not constitute a deferral of analysis and mitigation.
I46	13	William P. Parkin	3.8-18	The comment asks for clarification on the two baseline conditions that were utilized to evaluate impacts. Specifically, the comment asks if the future conditions-only baseline include the future conditions of the Searsville Dam.	The two baseline conditions used to evaluate impacts in Section 3.8, *Hydrology and Water Resources*, of the Draft EIR, include: (1) existing conditions where sediment mobilized from the upper San Francisquito Creek watershed would continue to be deposited and retained behind Searsville Dam, and storm flows would be attenuated by Searsville Reservoir; and (2) projected future conditions (estimated in about 20 years depending on precipitation and earthquakes), where Searsville Reservoir would have filled with sediment, and storm flow and sediment would overtop Searsville Dam. Because it is unknown when or even if a project at Searsville Dam and Reservoir moves forward, that possibility was not incorporated into the baseline conditions analysis. As stated previously, any project at Searsville would have to undergo its own environmental review.
Out I46	14	William P. Parkin	N/A	The comment questions why excavating and transporting sediment from Searsville Reservoir as an alternative to sediment flushing through the Creek was not considered.	As described in Chapter 1, *Introduction*, of the Draft EIR, Stanford University is currently exploring a project to modify the Searsville Dam and Reservoir. Although the SFCJPA is working with Stanford University to enable implementation, any modification of the reservoir, including sediment removal, would be implemented independently of the proposed project analyzed in the Draft EIR and would require separate environmental documents and permit applications.
I46	15	William P. Parkin	3.8-19; 3.8-22; 3.8-30	The comment states that more information regarding the historic sediment loading in the Creek is needed in order to compare the load to	The statement on page 3.8-22 regarding “return of the watershed’s sediment transport to historic conditions” refers to the filling of Searsville Reservoir with sediment and the resulting overtopping of Searsville

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				existing conditions and future conditions with the proposed project incorporated.	Dam with storm flow and sediment. CEQA requires that an EIR include a description of the physical environmental conditions in the vicinity of the project as they exist at the time the Notice of Preparation is published to provide a baseline for evaluating the alternatives and determining if an impact is significant. CEQA does not require a description and evaluation of the proposed project relative to historic conditions. As discussed in Section 3.8, *Hydrology and Water Resources*, the SFCJPA has considered future sediment conditions in planning the proposed project.
I46	16	William P. Parkin	2-38	The comment asks if the environmental commitments listed in Section 2.9, *Environmental Commitments*, would be incorporated into the mitigation monitoring and reporting program, and, if not, asks how the environmental commitments will be enforced.	As stated on page 2-38 of Chapter 2, *Program Description*, the environmental commitments included in Section 2.9 will be included in construction plan specifications and in the Mitigation Monitoring and Reporting Program.
I46	17	William P. Parkin	3.1-9	The comment notes that there should be a current image of the aerial view of Pope-Chaucer Bridge in order to accurately compare it to Image 3.1-1, *Pope-Chaucer Bridge Rendering Aerial View (1 to 2 years after construction).*	The Draft EIR provides sufficient details of the proposed changes at the Pope-Chaucer Bridge site as required under CEQA. However, an updated figure has been included on page 3.1-9 in the Final EIR with the caption "Pope-Chaucer Bridge looking downstream" that provides an additional perspective of the bridge for comparative purposes.
I46	18	William P. Parkin	3.1-1; 3.1-29	The comment asks for clarification of which regulations the project would be in accordance with to avoid spill of light and glare.	Amendments to the text of the Final EIR have been made on pages 3.1-1 and 3.1-29 for the purpose of clarification. These revisions specifically refer to compliance with the applicable general plans and municipal codes within the County of Santa Clara and the cities of San Mateo, Palo Alto, East Palo Alto, and Menlo Park.
I46	19	William P. Parkin	3.2-12; 3.2-21; 3.2-24; 3.2-26; 3.2-29	The comment states that the Draft EIR must include more information about emissions that would occur as a result of the demolition of the Pope-Chaucer Bridge and other demolition work in the Creek.	Section 3.2, *Air Quality*, of the Final EIR has been revised to explicitly discuss demolition-related air quality emissions and impacts (pages 3.2-12, 3.2-21, 3.2-24, 3.2-26, and 3.2-29).

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I46	20	William P. Parkin	N/A	The comment mentions the separate Newell Road Bridge Project, and asks "how much would the preferred project and each of the alternatives alone increase channel flow capacity?" .	The proposed project would increase conveyance capacity through the flood-prone reach of the creek to 7,500 cfs. None of the separate elements of the proposed project could achieve this objective. This EIR's Floodwalls Alternative, and the Newell Road Bridge project, share this objective. Upstream detention provided by the Reach 3 alternatives would not increase conveyance capacity; rather, it would temporarily hold water back during large flow events.
I46	21	William P. Parkin	1-5	The comment states that the Draft EIR is inadequate because the document does not include impacts of the proposed project on Reach 1 of the Creek or San Francisco Bay.	As described in Chapter 1, *Introduction*, page 1-5, of the Draft EIR, the SFCJPA implemented a previous project to increase flood conveyance capacity in Reach 1 of San Francisquito Creek. This earlier project was planned and designed to convey potentially greater flows and sediment loads associated with the project analyzed in this EIR.
I46	22	William P. Parkin	N/A	The comment requests that the commenter receive a copy of the Notice of Determination when it becomes available.	Per the commenter's request, a Notice of Determination will be provided upon project approval.
I47	1	William Reller	N/A	The comment provides support for replacing the existing Pope-Chaucer Bridge and widening the channel downstream.	The commenter's support for replacement of the Pope-Chaucer Bridge and downstream channel widening is noted.
I47	2	William Reller	N/A	The comment states that the commenter owns a parcel that extends to the center of San Francisquito Creek and would consider deeding the parcel to others if there was some sort of benefit.	The SFCJPA has reached out to the commenter regarding this land.
O1	1	The Crescent Park Neighborhood Association Steering Committee	N/A	The comment provides support for Alternative 2.	The commenter's support for Alternative 2 is noted.
O2	1	California Trout, Beyond	N/A	The comment provides introductory statements.	This comment does not raise a specific issue on the substance of the Draft EIR.

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		Searsville Dam, and Friends of the River			
O3	1	California Trout, Beyond Searsville Dam, and Friends of the River	N/A	The comment states that this letter is exactly identical to the letter previously submitted by California Trout, just that this version includes an e-signature.	This comment does not raise a specific issue on the substance of the Draft EIR.
O3	2	California Trout, Beyond Searsville Dam, and Friends of the River	N/A	The comment provides introductory statements and a summary of the history of the Central California steelhead population that resides in the Creek.	This comment does not raise a specific issue on the substance of the Draft EIR.
O3	3	California Trout, Beyond Searsville Dam, and Friends of the River	1-6 – 1-7; 3.3-64 – 3.3-72; 3.3-92 – 3.3-94	The comment expresses concerns that the proposed alternatives will have negative impacts on habitat for native fishes and that key information previously provided by the Searsville Advisory Group in 2015 to the SFCJPA was not included in the Draft EIR.	As described in Chapter 1, *Introduction*, of the Draft EIR, Stanford University is currently exploring a project to modify the Searsville Dam and Reservoir. Although the SFCJPA is working with Stanford University to enable implementation, that project would be implemented independently of the proposed project analyzed in the Draft EIR and would require the preparation of separate environmental documents and permit applications. Climate change impacts related to the proposed project are analyzed in Section 3.6, *Greenhouse Gas Emissions and Climate Change*, of the Draft EIR. Section 3.6, along with each of the other sections in Chapter 3 of the Draft EIR, include an analysis of the impacts of the alternatives carried forward for full analysis. Section 3.3, *Biological Resources*, of the Draft EIR provides an analysis of the impacts of the project and its alternatives on native fish habitat (see Impact BIO-2 on page 3.3-64 to 3.3-72 of the Final EIR).

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					In addition, Impact BIO-6, pages 3.3-92 and 3.3-94, in the Final EIR has also been revised to include a discussion of potential hydraulic and habitat effects on fish resulting from the proposed project.
O3	4	California Trout, Beyond Searsville Dam, and Friends of the River	1-6 – 1-7; 2-2; 3.8-41 – 3.8-42	The comment states that the Draft EIR does not contain information regarding sediment, streamflow, and precipitation future conditions in the watershed. The comment also states that the Draft EIR does not discuss the Searsville Dam and Reservoir and the impact that it would have on the proposed project.	As described in Chapter 2, *Program Description* (page 2-2), CEQA requires that an EIR include a description of the physical environmental conditions in the vicinity of the project as they exist at the time the Notice of Preparation is published. This description of constitutes the baseline conditions against which the lead agency will evaluate the alternatives and determine if an impact is significant. CEQA does not require a lead agency to identify future conditions; however, in the Draft EIR, two baseline conditions are used to evaluate impacts in Section 3.8 *Hydrology and Water Resources*. These include: (1) existing conditions where sediment mobilized from the upper San Francisquito Creek watershed would continue to be deposited and retained behind Searsville Dam, and storm flows would be attenuated by Searsville Reservoir; and (2) projected future conditions (estimated in 20 years depending upon precipitation and earthquakes), where Searsville Reservoir would have filled with sediment, and storm flow and sediment would overtop Searsville Dam. As Searsville Dam and Reservoir is not part of the proposed project, the potential impacts associated with existing and projected future conditions associated with the dam and reservoir are described in Section 3.8, *Hydrology and Water Resources*, under cumulative impacts of the Final EIR (pages 3.8-41 – 3.8-42).
O3	5	California Trout, Beyond Searsville Dam, and	N/A	The comment states that the cumulative analysis provided in the Draft EIR is not complete because it does not consider likely future projects in the watershed, including Searsville	Cumulative impacts are discussed in each of the sections included in Chapter 3, *Environmental Analysis*, of the Draft EIR. These analyses were conducted per the guidance provided in Section 15130(a) of the CEQA Guidelines, which states that

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		Friends of the River		Dam, and the cumulative impacts they would have on the watershed.	the "discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for the effects attributable to the project alone." Furthermore, in compliance with Section 15130(b)(1)(A), an EIR need only consider a list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside of the control of the agency. The Draft EIR thus includes those projects that have been identified as reasonably foreseeable. Aside from the cumulative impacts of the Searsville Dam Project, for which cumulative impacts have been appropriately addressed in the Draft EIR, the commenter's vague reference to "likely future projects in the watershed" does not identify any specific action or project for which a cumulative analysis has been omitted.
O3	6	California Trout, Beyond Searsville Dam, and Friends of the River	N/A	The comment notes that an Alternative provided by the Searsville Dam Advisory Group in 2015 to manage fish passage at Searsville Dam by utilizing the natural topography upstream of the Reservoir in the upper marsh for flood attenuation and for fish rearing habitat enhancements was not considered in the Draft EIR.	CEQA grants the lead agency discretion to determine what constitutes a reasonable range of alternatives to the proposed project, that accomplish most or all of the project objectives. In the case of the Draft EIR, the SFCJPA has proposed a reasonable range of alternatives that will be considered by the SFCJPA Board in deciding whether and how to proceed with this project.
O3	7	California Trout, Beyond Searsville Dam, and Friends of the River	N/A	The comment notes that no potential impacts of sea level rise on the project alternatives were included in the Draft EIR and neither were impacts of the project alternatives on sediment delivery to San Francisco Bay.	As described in Chapter 1, *Introduction*, of the Draft EIR, the SFCJPA has incorporated potential climate change effects into the San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project since project design began 10 years ago on the recently completed portion from San Francisco Bay through Highway 101. That downstream portion of the comprehensive project protects 3 miles of shoreline/creek bank against the maximum flow that could reach that area with a sea level 10 feet above today's daily high tide, making it the largest multi-

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					jurisdictional sea level rise project built in California to date. Because daily tides extend upstream of Highway 101 into the reach of the project proposed here, this same criteria is incorporated into the design of this project. Similarly, the completed Bay through Highway 101 project and the proposed project will accommodate and transport an increase in sediment loads associated with SFCJPA projects and climate change impacts. Climate change impacts associated with construction and operation of the proposed project are disclosed in Section 3.6, *Greenhouse Gas Emissions and Climate Change*.
O3	8	California Trout, Beyond Searsville Dam, and Friends of the River	3.3-92 – 3.3-94	The comment expresses concern over the depth of analysis and potential impacts of the proposed project on native fishes and fish habitat and provides several examples from the Draft EIR.	Text has been added to Impact BIO-6, pages 3.3-92 and 3.3-94, in the Final EIR to describe the potential impacts to the native fish species that are present in San Francisquito Creek. Mitigation Measures MM-BIO-14 and MM-BIO-16 will also protect native fish species and any loss of riparian vegetation will be compensated.
O3	9	California Trout, Beyond Searsville Dam, and Friends of the River	3.3-84 – 3.3-95	The comment expresses concern over the depth of analysis and potential impacts of the proposed project, the Former Nursery Detention Basin Alternative, and the Webb Ranch Detention Basin. Concerns specifically relate to project construction impacts on native fishes and fish habitat.	The Draft EIR analyzes the impacts of both the Floodwalls Alternative (at a project level) and the Detention Basin Alternatives (at a program level) in the relevant resource chapters of the Draft EIR, and recommends mitigation measures as appropriate to avoid or minimize construction and operations and maintenance related impacts. Construction and operation impacts of the Channel Widening Alternative on steelhead trout and suitable habitat (including native fish) are discussed under Impact BIO-6, beginning on page 3.3-84 of the EIR. MMs MM-BIO-14 and MM-BIO-15 are recommended to reduce these impacts. As noted on page 3.3-89, MM-BIO-14 limits the timing of pile installation for the piers and abutments (June 1–October 15) to avoid overlap with adult and juvenile steelhead migration and MM-BIO-15 reduces pile driving noise. Implementation of MM-BIO-14 and MM-BIO-15

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					would reduce this impact to less than significant. Additionally, MM-BIO-16 would implement avoidance measures to avoid or minimize impacts to aquatic vertebrates, and MM-BIO-17 would implement fish relocation activities prior to construction. In addition, Impact BIO-6, pages 3.3-92 and 3.3-94, in the Final EIR has also been revised to include a discussion of potential effects on fish habitat resulting from the proposed project. As stated on page 3.3-94 of the EIR, construction and operations/maintenance impacts associated with the Floodwalls Alternative would be the same or similar to the Channel Widening Alternative, and implementation of MM-BIO-14 through MM-BIO-17 would reduce impacts of the Floodwalls Alternative on fish and their habitat to a less-than-significant level. As described on page 3.3-95 these mitigation measures also would be implemented to minimize impacts to fish associated with construction of the Detention Basin Alternatives. To prevent fish from being trapped or stranded with operation of the Detention Basin Alternatives, a fish exclusion device would be installed at the weir in order to prevent fish from becoming trapped in the detention basin. The screen would be constructed using current NMFS guidelines for fish screens. Because flooding would rarely occur and the weir would be screened, this impact would be less than significant. Implementation of one or more of these alternatives would require detailed engineering design and subsequent environmental analysis of potential impacts associated with construction of inlet and outlet structures. Ongoing maintenance is not part of the project, and therefore, would result in no new impact that need be identified in the EIR.

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O3	10	California Trout, Beyond Searsville Dam, and Friends of the River	1-6 – 1-7; 3.8-41 – 3.8-42	The comment states that the Draft EIR is incomplete and inadequate because it provides little information about other planned work in the watershed, like the Searsville Dam Removal Project, and the cumulative impact these projects would have on the Creek.	The Draft EIR does describe other projects planned for the San Francisquito Creek watershed, including at Searsville Dam and Reservoir and Newell Road Bridge, and assesses the cumulative impacts of these projects in conjunction with the proposed project. The SFCJPA has been working with both the city of Palo Alto and Stanford University during the planning phases of these projects. The projected future conditions (estimated 20 years, depending upon precipitation and earthquakes), where Searsville Reservoir would have filled with sediment, and storm flow and sediment would overtop Searsville Dam are described in Section 3.8, *Hydrology and Water Resources*, of the Final EIR under cumulative impacts (pages 3.8-41 to 3.8-42).
O3	11	California Trout, Beyond Searsville Dam, and Friends of the River	1-6 – 1-7	The comment states that it is unwise to choose a preferred project alternative when the future status and actions related to the Searsville Dam and Reservoir are unknown.	As described in Chapter 1, *Introduction*, of the Draft EIR, although the SFCJPA is working with Stanford University to enable implementation of a project to modify Searsville Dam and Reservoir, that potential project, if implemented, would be analyzed independently of the proposed project. Local residents have made plain their expectation that the SFCJPA should not wait to move forward with the proposed project to protect thousands of previously flooded people and properties in the hope that, one day, a project at Searsville can be designed, permitted and built.
O3	12	California Trout, Beyond Searsville Dam, and Friends of the River	N/A	The comment suggests that the NMFS Biological Opinion or CDFW lake and streambed alteration agreement (LSAA) process includes a requirement for the SFCJPA to coordinate with Stanford regarding the Searsville Dam and any associated work. Additionally, the comment expresses interest that the Searsville Working Group would like to re-engage with the SFCJPA and Stanford.	The SFCJPA intends to pursue a Biological Opinion from NMFS and LSAA from CDFW that pertain to the proposed project evaluated in the Draft EIR, and not the Searsville Dam Project, for which Stanford University is currently the project proponent. The SFCJPA is continuing to engage with Stanford University regarding the Searsville Dam Project and would consider other avenues of communication.

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O4	1	Stanford University	N/A	The comment provides support for the capacity improvement project completed between the Bay and Highway 101, as well as the proposed project described in the Draft EIR.	The commenter's support for the project is noted.
O4	2	Stanford University	1-7	The comment states that any future project to acquire land for, construct, or operate detention basins would require subsequent CEQA review on a project-level basis, and that such a detailed review would require substantially more engineering and design work, and the evaluation of the impacts of soil excavation and off-haul, and on cultural and biological resources.	The SFCJPA agrees. The commenter is correct that the detention basin alternatives were analyzed at a program level in the EIR. As stated on page 1-7 of the EIR, should SFCJPA pursue such a project in Reach 3, the SFCJPA will need to acquire more information about potential basin sites in order to complete a more detailed project-level environmental analysis in additional CEQA documentation.
O5	1	Palo Alto Community Eruv	N/A	The comment provides a summary of what an Eruv is.	This comment does not raise a specific issue on the substance of the Draft EIR.
O5	2	Palo Alto Community Eruv	N/A	The comment expresses concerns over the projects impacts on the Community Eruv, specifically at Reach 2, during project construction. The comment also provides suggestions on how to mitigate impacts to the Eruv during project construction.	The SFCJPA will communicate with the commenter regarding this comment. This issue has not been identified as an impact under CEQA, therefore any adherence by the SFCJPA to this request is not considered mitigation.
O6	1	Allied Arts Guild	N/A	The comment states concern over bank erosion in the Creek and its impacts on the Allied Arts Guild building.	The SFCJPA is aware of this area of erosion and has worked with the Guild on potential design solutions. No work is proposed at or upstream of the Allied Arts Guild building.
O6	2	Allied Arts Guild	N/A	The comment states that the commenter spoke with an SFCJPA member at the June 5, 2019, community meeting and wants to follow up on steps the project will take to stabilize and restore the creek banks.	SFCJPA staff will continue communications with Allied Arts Guild on potential future actions along their property.
O7	1	Allied Arts Guild	N/A	The comment provides detail about previous bank loss and states concern over bank erosion in the Creek and its impacts on the Allied Arts Guild building.	This comment does not raise a specific issue on the substance of the Draft EIR. SFCJPA staff will continue communications with Allied Arts Guild on potential future actions along their property.
PH1	1	Public Hearing 1	N/A	The comment asks questions about bridge properties.	This comment does not raise a specific issue on the substance of the Draft EIR.

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PH1	2	Public Hearing 1	N/A	The comment inquires if homes would be taken out of the 100-year flood zone and if action with FEMA would be required if the proposed project is implemented.	The project alone would not remove all homes from the 100-year floodplain. Future actions to supplement the flood protection provided by the proposed project, which the SFCJPA is exploring, could do so.
PH1	3	Public Hearing 1	2-5	The comment asks questions about the hydrologic and capacity studies that were carried out by Stanford for Searsville Dam, what information these studies contained, and how much interaction there was between the SFCJPA and Stanford relating to these studies.	The SFCJPA and Stanford met a few times over the past year to discuss work by Stanford consultants on a hydraulic and sediment model, which was used to examine the cumulative effects of several project scenarios. The results of this work were summarized in Section 2.5.3 of the Draft EIR. SFCJPA has added additional detail to page 2-5 of the Final EIR regarding Stanford's work.
PH1	4	Public Hearing 1	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment requests detail about proposed tree removal upstream and downstream of the Pope-Chaucer Bridge.	Additional information regarding trees that may be removed during construction has been added to the Final EIR in Table 3.3-7, pages 3.3-78 to 3.3-82, and Figures 1 to 3 in Appendix B, showing potential tree removal locations. As noted on page 3.3-81, implementation of MM-BIO-12 and MM BIO-13 would reduce impacts on protected trees to a less-than-significant level.
PH1	5	Public Hearing 1	N/A	The commenter asks to see a rendering of the Pope-Chaucer Bridge but does not include a clear comment or question.	This comment does not raise a specific issue on the substance of the Draft EIR. The public meeting presentation included aerial renderings of new bridge next to images of the current bridge.
PH1	6	Public Hearing 1	N/A	The comment asks if an aerial rendering of the proposed bridge next to the existing Pope-Chaucer Bridge could be made available. Additionally, the comment asks several questions about the proposed bridge and roadway designs.	The public meeting presentation included aerial renderings of new bridge next to images of the current bridge. An updated figure has been included on page 3.1-9 in the Final EIR with the caption "Pope-Chaucer Bridge looking downstream" that provides a better perspective of the bridge for comparative purposes. This comment does not raise a specific issue on the substance of the Draft EIR.
PH1	7	Public Hearing 1	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3	The comment notes that a large bay laurel tree is proposed for removal as part of project construction.	The SFCJPA is working to reduce the number of trees removed for the project as much as possible. Additional information regarding trees that may be removed during construction has been added to Table 3.3-7, pages 3.3-78 to 3.3-82, and Figures 1 to 3 in

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			in Appendix B		Appendix B. showing potential tree removal locations. As noted on page 3.3-81, implementation of MM BIO-12 and MM BIO-13 would reduce impacts on protected trees to a less-than-significant level.
PH1	8	Public Hearing 1	N/A	The comment asks about the retaining walls that are to be incorporated as part of the proposed project. The comment also notes that more information regarding the trees that are proposed for removal needs to be provided.	The comment regarding the retaining walls is a clarifying question about the project, and does not raise a specific issue on the substance of the Draft EIR. A response is provided in the hearing transcript. See response to comments PH 1-4 and PH 1-7 regarding tree removal.
PH1	9	Public Hearing 1	N/A	The comment questions if the bridge design work that has currently be completed could be accessible to the public.	As noted during the public hearing, final designs will be prepared and will be available after the completion. This comment does not raise a specific issue on the substance of the Draft EIR.
PH1	10	Public Hearing 1	N/A	The comment notes that there is a possibility for sediment accumulation, as well as large tree debris during a large storm event, behind the bridge supports on either side of the Creek.	The SFCJPA evaluated the possibility of a single span bridge across the creek with no support piers. However, this design was not advanced because it would have required a thicker bridge deck and thus raised the elevation of road surface, resulting in greater impacts to adjacent roads and private homes. During large storm events, the current design allows for sediment to move downstream between the bridge piers and channel banks, and between the two bridge piers, which at 34 feet apart, allow debris to pass through as well.
PH1	11	Public Hearing 1	3.13-8 – 3.13-9	The comment asks about construction traffic and circulation, specifically, what route construction trucks are going to take and access to the Creek.	As required by MM-TT-2, a site-specific traffic control plan will be developed under the oversight of a licensed traffic engineer to minimize the effects of construction traffic on surrounding roadways. Among the requirements included in the plan would be to provide 72-hour advance notification to affected residents or businesses if access to driveways or private roads will be affected or limit effects on driveway and private roadway access to working hours and ensure that access to driveways and private roads is uninterrupted during non-work hours. If necessary, use of steel plates, temporary backfill, or

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					another accepted measure will be provided to ensure access. The plan will be subject to review and approval by the Cities of Palo Alto, Menlo Park and East Palo Alto. This input will take into account input regarding ways to minimize the duration of pedestrian detours, including shuttles.
PH1	12	Public Hearing 1	N/A	The comment notes that the Draft EIR does not make clear which alternatives are being recommended for the proposed project.	The commenter requested clarification on the structure of the EIR, and a response was provided in the context of the public hearing. This comment does not raise a specific issue on the substance of the Draft EIR.
PH1	13	Public Hearing 1	2-7 – 2-10	The comment states that all options for upstream detention should be considered, in order to avoid impacts to, and removal of, trees in the lower reaches of the Creek.	As described in Chapter 2, *Program Description*, of the Draft EIR, page 2-7 to 2-10), several options for upstream detention were identified and evaluated during the planning process. Alternative 9, Develop Multiple Small-scale Detention Facilities, was screened out as it would not meet the project’s objective for meaningful flood protection. Two alternatives within Reach 3, the Former Nursery Detention Basin and Webb Ranch Detention Basin, were analyzed in the EIR.
PH1	14	Public Hearing 1	N/A	The comment asks why more extensive upstream detention options have not been explored in order to minimize impacts to the lower reaches of the Creek. Additionally, the comment notes that there have also been flow constriction issues at the University Avenue Bridge.	Please see the response to comment PH1-13 regarding upstream detention basins. Regarding the flow capacity of the University Avenue Bridge, the proposed project’s plan to replace the existing temporary wooden extension of the University Avenue Bridge parapet with a permanent concrete or hydrostatic parapet extension of similar length and height will result in increased flow capacity at this location to 7,500 cfs.
PH1	15	Public Hearing 1	2-17 – 2-18	The comment asks for details concerning the proposed base of the channel at Pope-Chaucer Bridge, as well as operation and maintenance activities that may occur.	Chapter 2, *Program Description*, of the Final EIR, page 2-17 to 2-18, describes the current approach to modifying the channel at the Pope-Chaucer Bridge, which includes the installation of woody debris, boulders and pools at the channel bottom to enhance fish habitat. The SFCJPA and its partners are exploring options to further enhance the

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					environmental benefits and natural appearance of these modifications. Operation and maintenance would include annual inspection of constructed features for structural integrity, management of debris, substantial sediment deposition, and potentially hazardous vegetation.
PH1	16	Public Hearing 1	2-18; 2-34; Appendix F pages 186 – 258	The comment questions what will occur if construction takes longer than anticipated, and if there are any contingency plans in place.	The construction of the proposed project can be completed in two years, including the replacement of the Pope-Chaucer Bridge, which can be completed in nine months, likely in the second year of construction. The construction schedule and the potential for delay is discussed in detail in the public hearing transcript (see Appendix F, pages 186 to 258 for the public meeting on May 23, 2019). The construction process for each of the alternatives is also described in Chapter 2, *Program Description*, of the Draft EIR. Additionally, construction impacts are discussed throughout Chapter 3, *Environmental Analysis*, of the Draft EIR. In particular, Section 3.1, *Aesthetics*, Section 3.4, *Air Qua*lity, and Section 3.10, *Noise*, of the Draft EIR, discuss in detail the construction related impacts that may affect residents in the project area. These sections propose mitigation to minimize emissions, noise, and visual disturbance during project construction. The environmental commitments described on pages 2-26 through 2-46 of the Draft EIR also include best management practices and other measures to minimize construction related impacts.
PH1	17	Public Hearing 1	N/A	The comment asks how wide the proposed Pope-Chaucer Bridge would be.	The comment was a question on project details, and a response was provided during the hearing. The response is included in the hearing transcript. This comment does not raise a specific issue on the substance of the Draft EIR.
PH1	18	Public Hearing 1	N/A	The comment questions if roads would need to be closed temporarily as part of the regrading that would occur for the Pope-Chaucer Bridge.	The comment was a question regarding construction details, and a response was provided during the hearing. This response was included in the hearing transcript.

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PH1	19	Public Hearing 1	N/A	The comment asks what the flow capacity of the El Camino Bridge is.	The El Camino Real Bridge can convey greater than 8,800 cfs, which is greater than a 100-year flood event.
PH1	20	Public Hearing 1	N/A	The comment states that the renderings provided for the project are a great improvement to what was provided a couple of years ago. Additionally, the comment notes that the Creek is a special resource and that more recreational spaces and opportunities should be explored.	The comment was a question regarding project details related to Creekside recreational opportunities, and a response was provided during the hearing. This response was included in the hearing transcript. This comment does not raise a specific issue on the substance of the Draft EIR.
PH1	21	Public Hearing 1	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment notes that the Draft EIR does not include the locations of trees to be removed, and that there is a large eucalyptus tree that should remain.	See responses to comments A 2-15 and A 2-20 regarding documentation of impacts to trees in the Draft EIR.
PH1	22	Public Hearing 1	2-7 – 2-10	The comment questions if removing the Pope-Chaucer Bridge entirely was considered as an option.	As described in Chapter 2, *Program Description*, of the Draft EIR, an alternative was considered that would include removal of the Pope-Chaucer Bridge. That alternative, Alternative 11, Remove the Pope-Chaucer Bridge and Increase Capacity Downstream, was not carried forward for full analysis in the Draft EIR because the traffic impacts associated with bridge removal would not be consistent with the project’s objective to minimize community impacts, including delays in emergency response times in this area. See pages 2-7 and 2-10 of the Draft EIR.
PH1	23	Public Hearing 1	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment notes that it would be beneficial to include a figure that depicts all the locations of the trees that will remain.	Additional information regarding trees that may be removed during construction has been added to the Final EIR in Table 3.3-7, pages 3.3-78 to 3.3-82, and Figures 1 to 3 in Appendix B, showing potential tree removal locations. While this information does not specifically indicate which trees will remain, that can be reasonably ascertained from the information provided on trees to be removed.
PH1	24	Public Hearing 1	3.10-14	The comment asks if construction would be limited to during the day.	As discussed in Section 3.10, *Noise*, of the Draft EIR, it is likely that, to complete necessary aspects of the project, construction activity may be required outside

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					of the exemption hours, such as after 8 p.m. in East Palo Alto or on a Saturday in Menlo Park. As discussed on page 3.10-14 of the Draft EIR, implementation of the noise control measures included in Chapter 2, *Program Description*, of the Draft EIR, along with the mitigation measures included in Section 3.10, would reduce construction-related noise impacts to some extent. However, this impact was determined to be significant and unavoidable.
PH2	1	Public Hearing 2	N/A	The comment notes that even with the implementation of the proposed project, 100-year flood protection for residents nearby the Creek is still not attained.	This statement is correct. The proposed project will protect against a flow of 7,500 cfs, a flow seen once in the past 89 years but less than the 100-year event. This project would reduce the impacts of greater flows, including the 100-year flow. As discussed in Chapters 1 and 2, future actions to supplement the proposed project would be needed to achieve 100-year flow protection.
PH2	2	Public Hearing 2	N/A	The comment questions why the project scope is defined to include detention when detention construction and activities would be outside of the SFCJPA's jurisdiction.	Upstream detention, discussed in the EIR as potential projects at the Former Nursery Detention Basin, Webb Ranch Detention Basin, and Searsville Dam and Reservoir, would provide needed flood protection and could be undertaken by the SFCJPA.
PH2	3	Public Hearing 2	N/A	The comment asks what is the entire schedule and timeline of maximum proposed improvements to the entire Creek.	The Draft EIR states that the SFCJPA is working to enable construction to begin in 2020, but that given the complexities and uncertainties associated with permitting and funding this project, construction may not begin until 2021.. These construction details will be developed as part of the final design, and thus the final schedule is not available at this time.
PH2	4	Public Hearing 2	N/A	The comment questions how and where would temporary and permanent construction easements be needed for areas that involve channel widening.	The commenter is requesting details regarding project construction. The response is provided in the transcript of the public hearing. Construction details regarding the project and alternatives are included in Chapter 2, *Program Description*, of the Draft EIR, and related impacts are assessed throughout Chapter 3, *Environmental Analysis*, of the Draft EIR.

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PH2	5	Public Hearing 2	2-18 – 2-34	The comment confirms that construction equipment would be in the Creek bed.	The commenter is requesting details regarding project construction. The response is provided in the transcript of the public hearing. Construction details regarding the project and alternatives are included in Chapter 2, *Program Description*, of the Draft EIR, and related impacts are assessed throughout Chapter 3, *Environmental Analysis*, of the Draft EIR.
PH2	6	Public Hearing 2	2-18 – 2-34	The comment asks what would happen to the existing engineered wall in the Creek that is located near West Bayshore Road.	The commenter is requesting details regarding project construction. The response is provided in the transcript of the public hearing. Please note that construction details regarding the project and alternatives are also described in Chapter 2, *Program Description*, of the Draft EIR, and related impacts are assessed throughout Chapter 3, *Environmental Analysis*, of the Draft EIR.
PH3	1	Public Hearing 3	N/A	The comment questions if the Newell Bridge project would have the same 2-year projection construction timeline.	The two bridges would very likely not be replaced at the same time. The response is provided in the transcript of the public hearing. This comment does not raise a specific issue on the substance of the Draft EIR.
PH3	2	Public Hearing 3	N/A	The comment asks what properties would be affected by the expansion required for the Newell Bridge project.	The commenter had a question regarding whether the project would impact his property. The response is provided in the transcript of the public hearing. This comment does not raise a specific issue on the substance of the Draft EIR because the Newell Bridge project is a separate project of the City of Palo Alto, but is being coordinated with the proposed project and cumulative impacts were included in this Draft EIR.
PH3	3	Public Hearing 3	N/A	The comment questions if there are photos available for the Newell Bridge project.	The Newell Bridge project is not a part of the proposed project, but is being coordinated with the proposed project and cumulative impacts were included in the Draft EIR. The Newell Bridge Draft Environmental Impact Report has renderings of the proposed new bridge.
PH3	4	Public Hearing 3	N/A	The comment asks if DEIR stands for Draft EIR.	Yes, DEIR is Draft Environmental Impact Report

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PH3	5	Public Hearing 3	N/A	The comment questions whether Stanford is going to allow the SFCJPA to construct detention basins on their property.	Stanford University understands the risk and cost associated with flooding in communities downstream of the campus, which is why it is working with the SFCJPA to understand and enable the proposed project and a project at Searsville Dam and Reservoir. Should a project at Searsville not move forward, the SFCJPA will pursue a more detailed environmental analysis of potential projects to construct detention basins on Stanford property.
PH3	6	Public Hearing 3	N/A	The comment asks what is being incorporated into the proposed project to address sea level rise.	As described in Chapter 1, *Introduction*, of the Draft EIR, the SFCJPA has incorporated potential climate change effects into the San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project since project design began 10 years ago on the recently completed portion from San Francisco Bay through Highway 101. That downstream portion of the comprehensive project protects 3 miles of shoreline/creek bank against the maximum flow that could reach that area with a sea level 10 feet above today's daily high tide, making it the largest multi-jurisdictional sea level rise project built in California to date. Because daily tides extend upstream of Highway 101 into the reach of the project proposed here, this same criteria is incorporated into the design of this project.
PH3	7	Public Hearing 3	N/A	The comment notes concern that the proposed project will not solve or prevent street flooding.	Street flooding is largely a result of storm-drain systems being temporarily overwhelmed by heavy rainfall. The objective of the proposed project is to protect against the creek flood of record, which will significantly reduce the chance of street flooding resulting from a different source – water overtopping the creek bank and exiting the channel.
PH3	8	Public Hearing 3	N/A	The comment questions what exactly is different from the currently proposed Pope-Chaucer Bridge design and construction, and the previously proposed Pope-Chaucer Bridge designs and construction.	The commenter had questions regarding the evolution and details of the project. The response is provided in the transcript of the public hearing. This comment does not raise a specific issue on the substance of the Draft EIR.

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PH3	9	Public Hearing 3	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment notes confusion about the amount and location of trees proposed for removal.	Additional information regarding trees that may be removed during construction has been added to Table 3.3-7, pages 3.3-78 to 3.3-82, and Figures 1 to 3 in Appendix B, showing potential tree removal locations, have been added to the Final EIR.
PH3	10	Public Hearing 3	3.13-6 – 3.13-7	The comment asks for details concerning the amount of traffic increase at the Woodland-Middlefield intersection as a result of the proposed project.	Project related impacts to the Woodland-Middlefield intersection are discussed on pages 3.13-6 and 3.13-7 (in Section 3.13, Transportation) of the Draft EIR. As concluded in the Draft EIR, project related impacts at this intersection would be less than significant with implementation of MM TT-1, which requires a temporary traffic signal at the intersection of Middlefield Road and Woodland Avenue-Palo Alto Avenue.
PH3	11	Public Hearing 3	N/A	The comment provides support for the proposed project and asks if property near the proposed channel widening sites would be affected.	The commenter’s support for the project is noted. The response to the commenter’s question regarding property impacts is provided in the transcript of the public hearing. This comment does not raise a specific issue on the substance of the Draft EIR.
PH3	12	Public Hearing 3	2-7	The comment provides support for elimination of vehicle traffic on the proposed Pope-Chaucer Bridge and making it a pedestrian-only bridge.	As described on page 2-7 in Chapter 2, *Program Description*, of the Draft EIR, an alternative was considered that would replace the Pope-Chaucer Bridge with a bridge that would allow for greater flow capacity (i.e., 7,500 cfs) and accommodate only pedestrians and bicyclists, not motorized vehicles. The alternative (Alternative 12) was not advanced for full analysis because the traffic impacts of bridge removal would not be consistent with the project’s objective to minimize community impacts, including potential delays in emergency response times in this area.
PH3	13	Public Hearing 3	N/A	The comment asks if he proposed project is going to be adequate enough to protect the City and nearby residents.	The project will protect against the flood of record. Larger events could result in flooding, though reduced in scale, after the project is built.

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PH3	14	Public Hearing 3	1-6 – 1-7	The comment notes that there are very few details concerning Searsville Dam and that more information needs to be contained in the Draft EIR.	As described in Chapter 1, *Introduction*, of the Draft EIR, the SFCJPA is working with Stanford University to enable the implementation of a Stanford project at Searsville Dam. The SFCJPA may pursue the implementation of one or more detention basins in other locations on University property.
PH3	15	Public Hearing 3	N/A	The comment notes that sediment study of all the different alternatives considered should be included as an appendix in the Draft EIR.	All sediment analysis available to the SFCJPA will be shared with the public prior to the completion of the design process.
PH3	16	Public Hearing 3	N/A	The comment provides support for the work the SFCJPA has done.	The commenter’s support is noted.
PH3	17	Public Hearing 3	N/A	The comment provides support for the proposed project.	The commenter’s support for the project is noted.
PH3	18	Public Hearing 3	N/A	The comment states some background and historical information on why the Pope-Chaucer Bridge was constructed in the first place.	This comment does not raise a specific issue on the substance of the Draft EIR.
PH3	19	Public Hearing 3	N/A	The comment confirms that construction of the Pope-Chaucer Bridge cannot begin until construction on the Newell Street Bridge begins.	The construction of the new Pope-Chaucer Bridge cannot be completed prior to the completion of the new Newell Road Bridge.
PH3	20	Public Hearing 3	N/A	The comment asks for an explanation of why the University Avenue Bridge has a capacity of less than 7,200 cfs.	The University Avenue bridge structure can convey up to 7,500 cfs under pressure flow. Previous conveyance estimates below this level were the result of low top-of-bank elevation that will be addressed by the proposed project.
PH3	21	Public Hearing 3	3.3-78 – 3.3-82; Table 3.3.7, and Figures 1 to 3 in Appendix B	The comment asks why a large oak tree on the property is not included in the Draft EIR.	Additional information regarding trees that may be removed during construction has been added to the Final EIR in Table 3.3-7, pages 3.3-78 to 3.3-82, and Figures 1 to 3 in Appendix B, showing potential tree removal locations,
PH3	22	Public Hearing 3	N/A	The comment states that the construction of the Newell Street Bridge and Pope-Chaucer Bridge would greatly impact pedestrian and bicyclists activity in the area and that this needs to be considered in more detail.	The SFCJPA agrees. The timing of the construction of the Pope-Chaucer Bridge relative to the Newell-Street Bridge project is unknown at this time, must be well-coordinated, and will likely be timed so that both bridges are not closed at the same time.

Letter	Comment #	Commenter	Final EIR Page #	Summary of Comment	Response to Comment
PH3	23	Public Hearing 3	N/A	The comment asks if there is any way to include a pedestrian and bicyclists lane on the Pope-Chaucer Bridge before, during, and after construction.	The commenter's question regarding the possibility of maintaining pedestrian and/or bicycle access on Pope-Chaucer Bridge during project construction was responded to during the public hearing. Bike lanes are planned for the new Pope-Chaucer Bridge.
PH3	24	Public Hearing 3	N/A	The comment suggests planting oak trees in cement planter boxes instead of the proposed bulb-outs on the Pope-Chaucer Bridge as a way to maintain the Creek's character.	The SFCJPA will consider this suggestion during final design.
PH3	25	Public Hearing 3	N/A	The comment suggests temporarily constructing a bike bridge across the Creek in a location away from where project construction is occurring.	The SFCJPA is considering this option. Two other bike / pedestrian bridges within approximately one mile of the Pope-Chaucer Bridge are at Willow Place and at Alma Road.
PH3	26	Public Hearing 3	N/A	The comment questions if other natural alternatives, such as tree roots and vegetation, were considered instead of utilizing soil-nail walls and concrete in the Creek.	Unfortunately, because of high flow velocities associated with large food events, biotechnical alternatives such as tree roots and vegetation are not sufficient to prevent erosion of earthen stream banks. In addition, there is not sufficient space in this portion of the creek to implement log crib walls, and the log crib walls would require significantly more excavation of creek and bank than what is proposed.
PH3	27	Public Hearing 3	2-33	The comment asks if there are going to be regular maintenance activities in the Creek to remove objects that natural fall into the Creek.	Creek inspection and maintenance activities are performed each year prior to the rainy season. In addition, as described in Chapter 2, *Program Description*, (page 2-33) of the Draft EIR, specific to this project, an operations and maintenance manual will be developed for constructed features, including structural integrity, sediment deposition, and other items.
PH3	28	Public Hearing 3	N/A	The comment notes that there is a YouTube video of someone who rafts down the Creek starting at Stanford and ending at the Bay.	This comment does not raise a specific issue on the substance of the Draft EIR.
PH3	29	Public Hearing 3	N/A	The comment expresses concern over the erosion of the Creek bank near the Allied Arts Guild.	The SFCJPA is aware of this area of erosion and has worked with the Guild on potential design solutions. No work is proposed at or upstream of the Allied Arts Guild building.

Letter	Comment #	Commenter	Final EIR Page #	Summary of Comment	Response to Comment
PH3	30	Public Hearing 3	3.13-8 – 3.13-9	The comment expresses concern over construction impacts on pedestrian and bicyclists safety, specifically for children in the neighborhood, and notes that safety measures need to be included.	See responses to comments A 2-12, A 2-27, and PH 1-11, regarding MM-TT-2, which requires a traffic control plan be developed and implemented during project construction. The plan would include specific measures such as installation of fences, barriers, lights, flagging, guards, and signs, as determined appropriate, to give adequate warning to the public of the construction and potential dangerous conditions to be encountered as a result thereof.
PH3	31	Public Hearing 3	N/A	The comment states that if no temporary pedestrian/bicyclists bridge implemented during construction, people will resort to other methods of crossing the Creek and destroy existing vegetation.	The SFCJPA is discussing with the cities what options may exist for bicycle and pedestrian crossing during construction of the Pope-Chaucer Bridge.
PH3	32	Public Hearing 3	N/A	The comment notes that a bike lane is on Woodland Avenue.	This comment does not raise a specific issue on the substance of the Draft EIR.

Appendix G

San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101 Mitigation Monitoring and Reporting Plan

Table 1. Impacts and Mitigation for the San Francisquito Creek Flood Protection, Ecosystem Restoration, and Recreation Project Upstream of Highway 101

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
Aesthetics				
Mitigation Measure AES-1- Control Nighttime Lighting. The SFCJPA will ensure that if nighttime lighting at the construction site is required, lighting will be directed downward/on site, away from sensitive receptors (i.e., residences), and spillover light will be minimized to the greatest extent practicable.	All project elements, during construction	Construction Contractors	This measure will remain in effect for the duration of Project construction.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.
Air Quality				
Mitigation Measure AQ-1- Utilize clean diesel-powered equipment during construction to control construction-related NO_X emissions for all Alternatives and operations-related NO_X emissions for the Former Nursery Detention Basin Alternative and Webb Ranch Detention Basin Alternative. The project applicant will ensure that all off-road diesel-powered equipment used during construction and operations is equipped with EPA Tier 4 Final engines.	All project elements, during construction	Construction Contractors	This measure will remain in effect for the duration of Project construction.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.
Mitigation Measure AQ-2- Use on-road haul trucks with model year 2010 and newer engines during construction for all Alternatives and operations for the Former	All project elements, during construction	Construction Contractors	This measure will remain in effect for the duration of Project construction.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
Nursery Detention Basin Alternative and Webb Ranch Detention Basin Alternative. The SFCJPA will ensure that all on-road heavy-duty diesel haul trucks with a gross vehicle rating of 19,500 pounds or greater used at the project sites comply with EPA 2007 on-road emissions standards for PM10 and NO_X (0.01 grams per brake horsepower-hour [g/bhp-hr] and 0.20 g/bhp-hr, respectively).				documenting compliance.
Mitigation Measure AQ-3- Reduce construction emissions for all Alternatives and operations emissions for the Former Nursery Detention Basin Alternative and Webb Ranch Detention Basin Alternative to below BAAQMD NO_X thresholds. The SFCJPA will ensure construction- and operations-related emissions do not exceed BAAQMD's construction NO_X threshold of 54 pounds per day. In addition to implementing MM-AQ-1 and MM-AQ-2, the SFCJPA will coordinate with the BAAQMD to purchase NO_X credits to offset remaining NO_X construction and operations emissions exceeding BAAQMD thresholds. The SFCJPA will track construction and operations activity, estimate emissions, and enter into a construction mitigation contract with BAAQMD to offset NO_X emissions that exceed BAAQMD NO_X maximum daily threshold of 54 pounds per day.	All project elements, during construction	Construction Contractors	This measure will remain in effect for the duration of Project construction.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
The maximum daily emissions will be calculated on a daily basis by determining total construction- and operations-related NO_X emissions for each calendar day. BAAQMD will use the mitigation fees provided by the SFCJPA to implement emissions reduction efforts that offset project NO_X emissions that exceed the BAAQMD threshold. This mitigation includes the following specific requirements: • The SFCJPA will require construction contractors to provide daily construction and operational activity monitoring data for all construction activities and operations activities associated with alternatives Former Nursery Detention Basin Alternative and Webb Ranch Detention Basin Alternative to estimate actual construction and operational emissions, including the effect of equipment emissions reduction measures. The SFCJPA will submit the daily construction and operational activity monitoring data and an estimate of actual daily construction and operational emissions to SFCJPA and BAAQMD for review by the 15th day of each month for the prior construction month. The SFCJPA will examine the construction and operational activity monitoring to				

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
ensure it is representative, and BAAQMD will examine the emissions estimate to ensure it is calculated properly. • After acceptance of the emissions estimates by BAAQMD for the prior month, the SFCJPA will submit mitigation fees to BAAQMD to fund offsets for the portion of daily emissions that exceed the maximum daily NO_X threshold. The mitigation fees will be based on the mitigation contract with BAAQMD (see discussion below) but will not exceed the emissions-reduction project cost-effectiveness limit set for the Carl Moyer Program for the year in which mitigation fees are paid. The current Carl Moyer Program cost-effectiveness limit is $30,000 per weighted ton of criteria pollutants (NO_X + ROG + [20*PM]). An administrative fee of 5% will be paid by the SFCJPA to BAAQMD to implement the program. • The mitigation fees will be used by BAAQMD to fund projects that are eligible for funding under the Carl Moyer Program guidelines or other BAAQMD emissions-reduction incentive programs that meet the Carl Moyer Program cost-effectiveness threshold and are real, surplus, quantifiable, and enforceable.				

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
• The SFCJPA will enter into a mitigation contract with BAAQMD for the emissions-reduction incentive program. The mitigation contract will include the following: ○ Identification of appropriate offsite mitigation fees required for the project. ○ Timing for submission of mitigation fees. ○ Processing of mitigation fees paid by the SFCJPA. ○ Verification of emissions estimates submitted by the SFCJPA. ○ Verification that offsite fees are applied to appropriate mitigation programs within the SFBAAB. The mitigation fees will be submitted within 4 weeks after BAAQMD accepts an emissions estimate provided by the SFCJPA showing that the maximum daily NO_X threshold was exceeded (when measured on an daily basis).				
Mitigation Measure AQ-4- Implement BAAQMD's Basic Construction Mitigation Measures for all Alternatives and operations for the Former Nursery Detention Basin Alternative and Webb Ranch Detention Basin Alternative. The SFCJPA shall require all	All project elements, during construction and operation	Construction Contractors	This measure will remain in effect for the duration of Project construction and operation.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
construction contractors to implement the basic construction mitigation measures recommended by BAAQMD during all phases of construction, including demolition. The emissions reduction measures shall include, at a minimum, the following: • All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times a day. • All haul trucks shall be covered when transporting soil, sand, or other loose material offsite. • All visible mud or dirt track-out material on adjacent public roads shall be removed using wet-power vacuum-type street sweepers at least once a day. The use of dry-power sweeping is prohibited. • All vehicle speeds shall be limited to 15 miles per hour on unpaved roads. • All roadways, driveways, and sidewalks that are to be paved shall be paved as soon as possible. Building pads shall be laid as soon as possible after grading, unless seeding or soil binders are used. • All construction equipment shall be maintained and properly tuned in accordance with manufacturers' specifications. All equipment shall be				documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
checked by a certified visible-emissions evaluator. - 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). - Publicly visible signs shall be posted with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.				
Biological Resources				
Mitigation Measure BIO-1- Restrict construction access to previously disturbed areas. Existing access ramps and roads to waterways will be used where possible. If temporary access points are necessary, they will be constructed in a manner that minimizes impacts on waterways: - Temporary project access points will be created as close to the work area as possible to minimize running equipment in waterways and will be constructed to minimize adverse impacts.	All project elements, during construction	A qualified biologist retained by the SFCJPA will coordinate with CDFW and USFWS staff to establish setback buffers (i.e., determine their location and extent). The qualified biologist will either install construction fencing to protect undisturbed areas within the setback, or will supervise installation by	At each site, all setbacks will be established and fenced before any site preparation or construction activities are permitted to commence.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance. Setbacks will be established in consultation with CDFW and USFWS.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
- Any temporary fill used for access will be removed upon completion of the project. Site topography and geometry will be restored to pre-project conditions to the extent possible (Santa Clara Valley Water District Biological Resources BMP 4).		construction personnel. The biologist will be responsible for ensuring that fencing is installed without damage to undisturbed areas. All contractor staff will be expected to observe the setback buffers		
Mitigation Measure BIO-2- Revegetate disturbed areas with local ecotypes of native plants. Local ecotypes of native plants will be planted, and appropriate erosion-control seed mixes will be chosen. The following steps will be taken by a qualified biologist or vegetation specialist: - Evaluate whether the plant species currently grows wild in Santa Clara County. - If the plant species currently grows wild in Santa Clara County, the qualified biologist or vegetation specialist will determine whether the plant installation must include local natives (i.e., grown from propagules collected in the same or adjacent watershed and as close to the project site as feasible). - A qualified biologist or vegetation specialist will be consulted to determine which	All project elements, after construction	A qualified biologist/vegetation specialist retained by the SFCJPA will be responsible for identifying and mapping disturbed areas and preparing the revegetation plan.	The revegetation plan will be developed and restoration will be planned for after completion of construction. The revegetation plan will remain in force until the success criteria described in the plan are met.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance. The revegetation plan will be developed in consultation with resource agency staff.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
seeding option is ecologically appropriate and effective. The following guidelines will inform the biologist or vegetation specialist's determination. ○ For areas that are disturbed, an erosion-control seed mix may be used, consistent with the Santa Clara Valley Water District Stream Maintenance Program Update 2014-2023, Best Management Practices. ○ In areas with remnant native plants, the qualified biologist or vegetation specialist may choose an abiotic application instead, such as an erosion control blanket or seedless hydro-mulch and tackifier, to facilitate passive revegetation of native species. ○ Temporary earthen access roads may be seeded when site and horticultural conditions are suitable. ○ Seed selection will be ecologically appropriate, as determined by a qualified biologist, per Guidelines and Standards for Land Use near Streams, Design Guide 2, Use of Local Native Species, and the Supplemental Landscaping\Revegetation Guidelines.				

<table>
<thead>
<tr><th>Mitigation Measure</th><th>Required for the Following Sites/Project Phases</th><th>Implementation Responsibility</th><th>Implementation Timing</th><th>Monitoring, Enforcement, and Reporting Responsibility</th></tr>
</thead>
<tbody>
<tr><td>○ BMPs will be used to minimize the introduction of and spread of Phytophthora in accordance with the recommendations of California Oak Mortality Task Force.</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Mitigation Measure BIO-3- Conduct botanical surveys. SFCJPA will retain a qualified botanist to survey suitable habitat in the project area for special-status plants. Surveys will be conducted prior to site preparation or construction, during the appropriate blooming periods for each species as indicated in Table 3.3-5.
Table 3.3-5. Timing of Surveys for Special-Status Plants
<table>
<thead><tr><th>Species</th><th>Blooming Period</th></tr></thead>
<tbody>
<tr><td>Alkali milkvetch</td><td>Mar-Jun</td></tr>
<tr><td>Anderson’s manzanita</td><td>Nov-May</td></tr>
<tr><td>Arcuate bush mallow</td><td>Apr-Sep</td></tr>
<tr><td>Bent-flowered fiddleneck</td><td>Mar-Jun</td></tr>
<tr><td>California seablite</td><td>Jul-Oct</td></tr>
<tr><td>Choris’ popcornflower</td><td>Mar-Jun</td></tr>
<tr><td>Coastal marsh milk-vetch</td><td>Apr-Oct</td></tr>
<tr><td>Congdon’s tarplant</td><td>Jun-Nov</td></tr>
<tr><td>Crystal Springs fountain thistle</td><td>Apr-Oct</td></tr>
<tr><td>Crystal Springs lessingia</td><td>Jul-Oct</td></tr>
</tbody>
</table>
</td><td>All project elements, during construction</td><td>A qualified botanist or ecologist retained by the SFCJPA will perform the surveys, documentation, and reporting described in this measure.</td><td>Surveys will be completed during the blooming periods for each species before ground-disturbing activities begin. Surveys will take place far enough in advance of ground-disturbing activities to allow for Mitigation Measures BIO-4 and BIO-5 to be implemented if necessary.
Survey timing may be adjusted based on input from the qualified botanist/ecologist, based on variations in weather and other factors that influence the blooming period. If possible, surveys should be timed to coincide with blooming periods of</td><td>The SFCJPA’s project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.</td></tr>
</tbody>
</table>

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
Dudley's lousewort Apr-Jun Fragrant fritillary Feb-Apr Franciscan onion Apr-Jun Methuselah's beard lichen N/A Minute pocket moss N/A Point Reyes bird's-beak Jun-Oct Saline Clover Apr-Jun San Francisco campion Mar-Jun San Francisco collinsia Feb-May San Mateo thornmint Apr-Jun San Mateo woolly sunflower May-Jun Santa Clara red ribbons Apr-Jul Two-fork clover Apr-Jun Western leatherwood Jan-Mar White-flowered rein orchid Mar-Sep White-rayed pentachaeta Mar-May Surveys will follow the *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Species* (U.S. Fish and Wildlife Service 1996), *General Plant Survey Guidelines* (U.S. Fish and			known local populations.	

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
Wildlife Service 2002), and *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities* (CDFW 2018b). Special-status plants identified during the surveys will be mapped using a handheld global positioning system unit and documented as part of the public record. A report of occurrences will be submitted to SFCJPA and the CNDDB. Surveys will be completed before ground-disturbing activities begin; survey timing will allow for follow-up mitigation, if needed. If the qualified biologist determines that individuals of identified special-status plant species could be affected by construction traffic or activities, MM-BIO-4 and, if necessary, MM-BIO-5, will be implemented.				
Mitigation Measure BIO-4- Confine construction disturbance and protect special-status species during construction. Construction disturbance will be confined to the minimum area necessary to complete the work and will avoid encroachment on adjacent habitat. If special-status plants are found, a setback buffer will be established around individual plants or the area occupied by the population, based on the judgment of a qualified botanist. The plants, as well as a species-appropriate buffer area determined in consultation with agency staff (CDFW and	All project elements, during construction	A qualified botanist or ecologist retained by the SFCJPA will coordinate with CDFW and USFWS staff to establish setback buffers (i.e., determine their location and extent). The qualified botanist/ecologist will either install construction fencing to protect plants within the setback, or will supervise	At each site, all setbacks will be established and fenced before any site preparation or construction activities are permitted to commence.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance. Setbacks will be established in consultation with CDFW and USFWS.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
USFWS), will be protected from encroachment and damage during construction by installing temporary construction fencing. Fencing will be brightly colored and highly visible. Fencing will be installed under the supervision of a qualified botanist to ensure proper location and prevent damage to plants during installation. Fencing will be installed before site preparation or construction work begins and will remain in place for the duration of construction. Construction personnel will be prohibited from entering these areas (the exclusion zone) for the duration of project construction. Fencing installation will be coordinated with fence installation required by other mitigation measures protecting wetlands, riparian habitat, and mature trees.		installation by construction personnel. The botanist/ecologist will be responsible for ensuring that fencing is installed without damage to special-status plants. All contractor staff will be expected to observe the setback buffers.		
Mitigation Measure BIO-5- Compensate for loss of special-status plants. If any individual special-status plants are present and cannot be effectively avoided through implementation of MM-BIO-4, SFCJPA will develop and implement a compensation plan so that there is no net loss of special-status plants. The compensation plan will be developed by a qualified botanist in coordination with and approval of CDFW or USFWS, depending on whether the plant has state or federal status, respectively, or both. The compensation plan will preserve an offsite	All Project elements, prior to construction	A qualified botanist or ecologist retained by the SFCJPA will coordinate with CDFW and USFWS to develop the compensation plan and monitoring and adaptive management plan. The SFCJPA's project manager will be responsible for implementing the plan.	If propagation is required, propagules will be collected before ground disturbance begins. Any transplantation will also occur prior to ground disturbance. Compensation described in this measure will be arranged, and if possible, completed	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance. SFCJPA will submit documentation of the completed compensation and subsequent monitoring and adaptive management

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
area containing individuals of the affected species. The offsite compensation area will contain a population and/or acreage equal to or greater than that lost as a result of project implementation and will include adjacent areas as needed to preserve the special-status plant population in compliance with applicable permits. Compensation of the affected population will occur in an amount equal to or greater than the amount lost as a result of the project to ensure that genetic diversity is preserved and no net loss of the number of individuals occurs. The quality of the population preserved will also be equal to or greater than that of the affected population, as determined by a qualified botanist retained by the SFCJPA. The SFCJPA will be responsible for ensuring that the compensation area is acquired in fee by the SFCJPA or one of the partner agencies, or in conservation easement, maintained for the benefit of the special-status plant population in compliance with applicable permits. If an offsite population is not located or is not available for preservation, SFCJPA will employ a qualified nursery to collect and propagate the affected species, collected at the appropriate time of year, prior to population disturbance at			prior to groundbreaking.	plan results to DFG and USFWS

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
the affected areas of the project. Transplantation will also be implemented if practicable for the species affected, including mature native plants to the extent feasible. A monitoring and adaptive management plan will be developed for each compensation area, subject to CDFW and USFWS approval. This plan will establish success criteria for the site and will include protocols for annual monitoring of the site. The goal of monitoring will be to assess whether the compensation plan has successfully mitigated project impacts; monitoring will be designed to ensure that the required number of plants and/or plant acreage is being sustained through site maintenance. Factors to be monitored shall include, at a minimum, density, population size, natural recruitment, and plant health and vigor. If monitoring indicates that special-status plant populations are not maintaining themselves, adaptive management techniques will be implemented. Such techniques could include reseeding/replanting, nonnative species removal, and other management tools. The site will be evaluated at the end of the monitoring period by a qualified biologist to determine whether the mitigation has met the goal of this mitigation measure to preserve a population the same size and of equal or greater quality as that lost as a result of project activities at the				

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
site. Criteria by which this determination will be made will be established in the monitoring plan. The monitoring plan will also address adaptive management strategies to be adopted if the evaluation determines that the site does not meet the success criteria. In that case, a monitoring plan will stay in place until the success criteria are met.				

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
Mitigation Measure BIO-6- Develop and implement worker awareness training. Prior to construction, a qualified biologist will conduct a Worker Awareness Training to inform construction project workers of their responsibilities regarding sensitive environmental resources. The training will include environmental education about the aquatic and terrestrial special-status species (steelhead trout, California red-legged frog, western pond turtle, pallid bat, hoary bat, Townsend's big-eared bat, nesting migratory birds and raptors, Bay checkerspot butterfly, California tiger salamander, Santa Cruz black salamander, California giant salamander, San Francisco dusky-footed woodrat, and western burrowing owl), as well as sensitive habitat (e.g., in-stream habitat, riparian habitat, wetlands, serpentine). The training will include visual aids to assist in identification of regulated biological resources, actions to take should protected wildlife be observed within the project area, and possible legal repercussions of impacting such regulated resources.	All Project elements, prior to construction	The SFCJPA will retain a qualified wildlife biologist to implement this measure for construction contractor crews.	Construction crew training will occur prior to any work on the site.	For the construction period, the SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance. For the operational period, the SFCJPA's designated maintenance manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.
Mitigation Measure BIO-7- Identify and protect sensitive habitats. To avoid unnecessary damage to or removal of sensitive habitat, the SFCJPA will retain a qualified	All project elements, during construction	A qualified biologist retained by the SFCJPA will coordinate with CDFW and USFWS	At each site, all setbacks will be established and fenced before any site preparation or	The SFCJPA's project manager will be responsible for ensuring proper implementation, for

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
biologist or ecologist to survey and demarcate sensitive habitat on or adjacent to the proposed areas of construction in San Francisquito Creek. Sensitive habitat not slated for trimming or removal to accommodate project construction will be protected from encroachment and damage during construction by installing temporary construction fencing to create a no-activity exclusion zone. Fencing will be brightly colored and highly visible and installed under the supervision of a qualified biologist to prevent damage to sensitive habitat during installation. The fencing will protect all potentially affected riparian habitat consistent with International Society of Arboriculture tree protection zone recommendations, to the extent possible, and any additional requirements of the resource agencies with jurisdiction over the project. Fencing will be installed before any site preparation or construction work begins and will remain in place for the duration of construction. Any sensitive vegetation will be trimmed with the approval of an International Society of Arboriculture certified arborist who will develop an approach to minimize stress and potential damage to trees and shrubs. Construction personnel will be prohibited from entering the exclusion zone for the duration of project construction. Access and surface-		staff to establish setback buffers (i.e., determine their location and extent). The qualified biologist will either install construction fencing to protect sensitive areas within the setback, or will supervise installation by construction personnel. The biologist will be responsible for ensuring that fencing is installed without damage to sensitive areas. All contractor staff will be expected to observe the setback buffers	construction activities are permitted to commence.	enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
disturbing activities will be prohibited within the exclusion zone.				
Mitigation Measure BIO-8- Restore riparian habitat. The SFCJPA will restore any permanently affected riparian habitat at a mitigation-to-impact ratio of 2:1 and restoring temporarily affected habitat at a minimum impact-to-mitigation ratio of 1:1 to ensure no net loss of riparian habitat in the affected stream reaches. SFCJPA will carry out additional plantings outside of the construction areas above Pope Chaucer Bridge, from University Avenue west to the Stanford Shopping Center, and will carry out invasive plant removal downstream of University Avenue and upstream to Stanford Shopping Center (See Figure 3.3-4). The SFCJPA will develop a Habitat Mitigation and Monitoring Plan (HMMP) to ensure that all permanently affected or removed habitat is replaced "in kind" with the appropriate native overstory and understory species to maintain structural complexity and habitat value. The MMP will be developed in the context of the federal and state permitting processes under the CWA and the California Fish and Game Code and will include success criteria as specified by the permitting agencies. The HMMP will also include adaptive management guidelines for actions to be taken if the success criteria are	All Project elements, prior to construction	A qualified botanist or ecologist retained by the SFCJPA will be responsible for identifying and mapping riparian areas and preparing the HMMP.	The HMMP will be developed and restoration will be planned during the permit process, prior to groundbreaking. The HMMP will remain in force until the success criteria described in the plan are met.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance. The HMMP will be developed in consultation with resource agency staff.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
not met. The initial annual monitoring will assess progress of the plantings according to predetermined success criteria. If progress is not satisfactory, adaptive management actions (including replanting, nonnative species removal, etc.) could be implemented. The HMMP will remain in force until the success criteria are met.				
Mitigation Measure BIO-9- Avoid and protect jurisdictional wetlands during construction. The SFCJPA will ensure that a qualified resource specialist (biologist, ecologist, or soil scientist) clearly identifies wetland areas outside of the direct impact footprint with temporary orange construction fencing, before site preparation and construction activities begin at each site, or the qualified resources specialist will implement another suitable low-impact measure The resource specialist will use the wetland delineation mapping prepared for the proposed project and will confirm or modify the location of wetland boundaries based on existing conditions at the time of the survey. Exclusion fencing will be installed before construction activities are initiated, and the fencing will be maintained throughout the construction period. No construction activity, traffic, equipment, or materials will be permitted in fenced wetland areas.	All Project elements, prior to construction	A qualified botanist or ecologist retained by the SFCJPA will establish setback buffers (i.e., determine their location and extent). The qualified botanist/ecologist will either install the construction fencing to protect jurisdictional wetlands within the setback, or will supervise installation by construction personnel.	Surveys will be conducted and setbacks will be established before work begins. Fencing will remain in place for the duration of construction, site finishing, and demobilization.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
Mitigation Measure BIO-10- Compensate for loss of wetland habitat. If wetlands are affected by the construction activities, compensation will be at a 2:1 ratio for permanent impacts and at 1:1 ratio for temporary impacts. Restoration, creation, or enhancement of wetlands will either be off site or on site and will be detailed in the HMMP.	All Project elements, prior to construction	The SFCJPA will retain a qualified wildlife biologist to implement this measure.	Compensation described in this measure will be arranged, and if possible, completed prior to groundbreaking.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.
Mitigation Measure BIO-12- Compensate for loss of trees, consistent with applicable tree protection regulations. The cities of Palo Alto, East Palo Alto and Menlo Park do not permit removal of protected trees until a construction permit has been issued that ensures that tree loss would not conflict with tree ordinances/regulations. Each of these cities has its own specifications for calculating mitigation for tree impacts. A written permit is required to remove a protected tree. The project will compensate for permanent construction-related losses (removal or damage) of protected trees by replanting trees after completion of the construction activities. The compensatory ratios and planting locations will be confirmed through coordination with the SFCJPA and each City's regulations for the proposed project. Additionally, trees may fall into CDFW regulations and would be compensated for under the Streambed Alteration	All Project elements, prior to construction	Surveys and reporting will be performed by an ISA- (International Society of Arboriculture) or ASCA- (American Society of Consulting Arborists) certified arborists retained by the SFCJPA. Landscape plans will be developed by a licensed landscape architect and/or civil engineer in consultation with the arborist and SFCJPA project manager. Transplantation and compensation planting swill be performed by the contractor staff under the supervision of the certified arborist.	The arborist surveys will be performed during Project design. The landscaping plan, which will determine the feasibility of transplanting protected trees, will be completed prior to groundbreaking. Transplantation efforts, if determined feasible by the certified arborist, will take place during construction as protected trees are removed. If transplantation is not feasible, compensation will be arranged, and if possible, completed prior to groundbreaking. Any	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
Permit. The areas shown in Figure 3.3-4 have been identified as having potential for planting new trees including riparian vegetation and also invasive plant species removal.			onsite compensation plantings will be provided during Project construction/site finishing.	
Mitigation Measure BIO-13- Protect Trees from Construction Impacts. The following steps will be taken to reduce impacts on trees and maintain their health and vitality: 1. A licensed arborist selected by a panel of SFCJPA member agency representatives will be secured prior to construction. The Project Arborist will submit a tree protection plan for review prior to mobilization. 2. Construction superintendents will meet with the Project Arborist before beginning work to review all work procedures, access routes, storage areas, and tree protection measures. 3. The Project Arborist will monitor excavation and removal of sacked concrete as well as during the installation of vertical walls, including soil nail walls and sheetpile walls within 25 feet of trees. 4. If roots 2 inches and greater in diameter are encountered during site work and must be cut to complete the construction, the	All Project elements, prior to construction.	An ISA- (International Society of Arboriculture) or ASCA- (American Society of Consulting Arborists) certified arborist retained by the SFCJPA will either install the construction fencing to protect remaining trees within the setback, or will supervise installation by construction personnel. Follow up monitoring will also be performed by a certified arborist.	At each site, all setbacks will be established and fenced before any site preparation or construction activities are permitted to commence.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
Project Arborist must be consulted to evaluate effects on the health and stability of the tree and recommend treatment. 5. Sacked concrete within 25 feet of trees will be removed with equipment that will minimize damage to trees above and below ground, and that can be operated from outside the dripline of the trees. 6. If injury should occur to any tree during construction, the tree will be evaluated as soon as possible by the Project Arborist so that appropriate treatments can be applied. Additional compensation in the form of mitigation planting will be considered if treatments cannot fully mitigate damages to protected trees. 7. No excess soil, chemicals, debris, equipment or other materials will be dumped or stored within the dripline of any trees. 8. Any additional tree pruning needed for clearance during construction must be performed by a Certified Arborist and not by construction personnel. The Project Arborist may conclude that a tree(s) should be removed because it could be damaged to an extent that would pose a safety hazard to people or nearby structures. If a tree				

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
is removed, its removal will be mitigated as provided by MM-BIO-12.				
Mitigation Measure BIO-14- Limit in-channel and stream bank construction to the dry season. No in-channel stream bank construction activities will occur during the steelhead migration period, from October 15 through May 31, to reduce the likelihood that steelhead are present during construction activities. This timing will also limit any excess sedimentation and runoff from entering the San Francisquito Creek.	All Project elements, prior to, and during, construction.	The SFCJPA's project manager will appoint a designated individual to oversee that no in-channel stream bank construction activities occur during the steelhead migration period.	No in-channel stream bank construction activities will occur from October 1 through April 30.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.
Mitigation Measure BIO-15- Reduce pile-driving noise for protection of fish. If surface water is present in the channel in or near the Pope Chaucer bridge footprint three days before commencement of pile driving, SFCJPA will develop an underwater noise monitoring and attenuation plan and obtain approval of the plan from NMFS prior to the start of construction. If there is no surface water present in or near the Pope Chaucer bridge footprint or if an approved biologist determines that the surface water is not occupied by fish, an underwater monitoring and attenuation plan is not necessary. The plan will provide details regarding the estimated underwater sound levels expected,	Replacement of the Pope-Chaucer bridge	SFCJPA will retain a qualified acoustical professional to develop and implement the noise monitoring plan.	Plan will be develop prior to demolition of the existing Pope-Chaucer bridge, and monitoring will continue until all pile-driving activities are complete.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
sound attenuation methods, methods used to monitor and verify sound levels during pile-driving activities, and management practices to be taken to reduce pile-driving sound in the project area to below NMFS thresholds for injury to fish, as feasible. The plan will incorporate, but is not limited to, the following BMPs: • All steel pilings will be installed with a vibratory pile driver to the deepest depth practicable. An impact pile driver may be used only where necessary to complete installation of the steel pilings, in accordance with seismic safety or other engineering criteria. • The smallest pile driver and minimum force necessary will be used to complete the work. • The hammer will be cushioned using a 12-inch-thick wood block during all impact hammer pile-driving operations. • During impact pile driving, the contractor will limit the number of strikes per day to the minimum necessary to complete the work. • No pile driving will occur at night.				

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
Mitigation Measure BIO-16- Implement avoidance measures for aquatic vertebrates prior to construction activities. This measure will avoid or minimize impacts on native aquatic vertebrates (fish, amphibians, and reptiles). Native aquatic vertebrates may or may not be able to rapidly recolonize a stream reach if the population is eliminated from that stream reach. If native aquatic vertebrates are present when cofferdams, water bypass structures, and silt barriers are to be installed, an evaluation of the stream and the native aquatic vertebrates will be conducted by a qualified biologist. The qualified biologist will consider: • Native aquatic species present at the site. • The ability of the species to naturally recolonize the stream reach. • The life stages of the native aquatic vertebrates present. • The flow, depth, topography, substrate, chemistry, and temperature of the stream reach. • The feasibility of relocating the aquatic species present. • The likelihood the stream reach will naturally dry up during the work season.	All Project elements, prior to construction	A qualified biologist retained by the SFCJPA will be responsible for the surveys described in this measure and for any needed consultation with other resource agencies.	Surveys will take place no more than 48 hours prior to the onset of work.	For the construction period, the SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance. For the operational period, the SFCJPA's designated maintenance manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance. Protection measures will be identified in consultation with other resource agencies as necessary.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
Based on consideration of these factors, the qualified biologist may decide to relocate native aquatic vertebrates during construction. The qualified biologist will document in writing the reasons to relocate native aquatic species, or not to relocate native aquatic species, prior to installation of cofferdams, water bypass structures, or silt barriers.				
Mitigation Measure BIO-17- Implement fish relocation activities prior to construction. A qualified fisheries biologist will survey the construction area 1 to 2 days before the project begins. If no surface water is present in the immediate construction area, fish will not be relocated. If water is present, the following procedures will be implemented: • Before a work area is dewatered, fish will be captured and relocated to avoid injury and mortality and minimize disturbance. • Before fish relocation begins, a qualified fisheries biologist will identify the most appropriate release location(s). Release locations should have water temperatures similar to the capture location and offer ample habitat for released fish, and should be selected to minimize the likelihood that fish will reenter the work area or become impinged on the exclusion net or screen. At	All Project elements, prior to construction	A qualified fisheries biologist retained by the SFCJPA will be responsible for the surveys described in this measure and for any needed consultation with NMFS and CDFW.	Surveys will take place no more than 48 hours prior to the onset of work.	For the construction period, the SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance. For the operational period, the SFCJPA's designated maintenance manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance. Protection measures will be identified in consultation with NMFS and CDFW as necessary.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
this time the open reach below the project site is anticipated to have suitable conditions for relocation. • Seining or dip netting will be utilized to keep stress and injury to fish at a minimum. • To the extent feasible, relocation will be performed during morning periods. Water temperatures will be measured periodically, and relocation activities will be suspended if water temperature exceeds 18^{0}C. • Handling of salmonids will be minimized. When necessary, personnel will wet hands or nets before touching fish. • Fish will be held temporarily in cool, shaded water in a container with a lid. Overcrowding in containers will be avoided. Fish will be relocated promptly at location(s) approved by CDFW and NMFS. If water temperature within the container reaches or exceeds NMFS and CDFW limits, fish will be released and relocation operations will cease. • If fish are abundant, capture will cease periodically to allow release and minimize the time fish spend in holding containers. • Fish will not be anesthetized or measured. However, they will be visually identified to				

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
species level, and year classes will be estimated and recorded. - Reports on fish relocation activities will be submitted to CDFW and NMFS within 30 days of completion of the relocation activities. - If mortality during relocation exceeds 5% or mortality of any State or Federal listed species occurs, relocation will cease and CDFW and NMFS will be contacted immediately or as soon as feasible. - Fish relocation efforts will be performed concurrent with the installation of the diversion and will be completed before the channel is fully dewatered. The fisheries biologist will perform a second survey 1 to 2 days following the installation of the diversion to ensure that fish have been excluded from the work area and spot checks will be performed at least biweekly while the diversion is in place.				
Mitigation Measure BIO-18- Implement survey and avoidance measures for California red-legged frog prior to construction activities. SFCJPA will retain a qualified biologist to conduct a survey of the project sites and surrounding upland habitat prior to initiation of construction activities. The	All Project elements, prior to construction	The SFCJPA will retain a qualified wildlife biologist to implement this measure.	The surveys and any needed relocation of individuals described in this measure will be performed before site preparation and construction activity begins.	For the construction period, the SCJPA's project manager will be responsible for ensuing proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
surveys will be conducted according to applicable protocols and will be performed during observation periods of the day when detection potential for these species is maximized. The surveys will be conducted prior to initiation of construction, but such that enough time is allowed to coordinate with USFWS and CDFW to develop a species avoidance plan if needed. If California red-legged frog are observed or heard during the surveys, proposed project activities within 500 feet of the observation will be postponed. A species avoidance plan will be developed in coordination with USFWS and CDFW and implemented during construction and maintenance. If no individuals are observed during the surveys, no further action will be necessary.			Fencing will remain in place for the duration of construction or maintenance activity.	For the operational period, the SFCJPA's designated maintenance manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance. Relocation sites will be established in consultation with CDFW and USFWS as necessary. A written report will be submitted to CDFW and USFWS detailing the survey results of listed amphibians and subsequent relocation activities (if necessary).
Mitigation Measure BIO-20- Conduct preconstruction surveys for western pond turtles; relocate if needed. A qualified biologist will examine the project footprint for western pond turtles and their nests within 14 days of project activities beginning and during any initial removal of vegetation, woody debris, or trees, or other initial ground-disturbing	All Project elements, prior to construction	The SFCJPA will retain a qualified wildlife biologist to implement this measure.	The surveys and any needed relocation of individuals described in this measure will be performed before site preparation and construction activity begins.	For the construction period, the SCJPA's project manager will be responsible for ensuing proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
activities. If a western pond turtle(s) is observed at any time within the project footprint and can be injured by project activities, all activities will cease. If western pond turtles are determined to be absent from the project footprint, no further action will be required with regard to this species. If any western pond turtles are found within the project footprint, whenever possible, construction work in their vicinity will be avoided until they have moved outside of the project footprint of their own volition. If the relocation of western pond turtle is necessary, a relocation plan will be developed and submitted to CDFW for approval. The plan will include details of monitoring by a CDFW-approved biologist, agency-approved disinfection and handling protocols, animal care while being relocated, suitable deposition locations, and reporting requirements. The CDFW-approved biologist will follow all applicable CDFW disinfection and handling protocols per the relocation plan.			Fencing will remain in place for the duration of construction or maintenance activity.	For the operational period, the SFCJPA's designated maintenance manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance. Relocation sites will be established in consultation with CDFW and USFWS as necessary. A written report will be submitted to CDFW and USFWS detailing the survey results of listed amphibians and subsequent relocation activities (if necessary).
Mitigation Measure BIO-21- Implement preconstruction survey for pallid, hoary, and Townsend's big-eared bats. A qualified biologist will examine the Pope Chaucer Bridge and trees within the project site for roosting pallid and hoary bats no more than 48 hours before any initial removal of vegetation, woody	All Project elements, prior to construction	The SFCJPA will retain a qualified wildlife biologist to implement this measure.	The surveys and any needed relocation of individuals described in this measure will be performed before site preparation and construction activity begins.	For the construction period, the SCJPA's project manager will be responsible for ensuing proper implementation, for enforcement, and for

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
debris, or trees, or other initial ground-disturbing activities. In Reach 3, abandoned buildings will be surveyed if observed within 500 feet of the project footprint. If a bat is observed roosting at any time before or during project activities, all activities will cease. SFCJPA will coordinate with CDFW to develop and implement avoidance measures before commencing project activities.			Fencing will remain in place for the duration of construction or maintenance activity.	documenting compliance. For the operational period, the SFCJPA's designated maintenance manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance. Relocation sites will be established in consultation with CDFW and USFWS as necessary. A written report will be submitted to CDFW and USFWS detailing the survey results of listed amphibians and subsequent relocation activities (if necessary).
Mitigation Measure BIO-22- Install nesting exclusion devices. Nesting exclusion devices will be installed to prevent potential establishment or occurrence of nests in areas where construction activities would occur. All nesting exclusion devices will be maintained	All Project elements, during construction	A qualified biologist retained by the SFCJPA will be responsible for the implementation and usage of nesting exclusion devices.	At each site, nesting exclusion device locations will be established before any site preparation or construction activities are	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
throughout the nesting season or until completion of work in an area makes the devices unnecessary. All exclusion devices will be removed and disposed of when work in the area is complete (Santa Clara Valley Water District Biological Resources BMP 10).			permitted to commence.	documenting compliance.
Mitigation Measure BIO-23- Conduct preconstruction nesting bird surveys. Prior to the start of construction activities and/or operation and maintenance activities that begin during the migratory bird nesting period (between January 15 and August 31 of any year), SFCJPA will retain a qualified wildlife biologist to conduct a survey for nesting raptors and migratory birds that could nest along the project corridor, including special-status species such as salt marsh common yellowthroat, Alameda song sparrow, northern harrier, and white-tailed kite. Surveys will cover all suitable raptor and migratory bird nesting habitat that will be impacted directly or indirectly by project construction, including habitat potentially used by ground-nesting migratory bird species. All migratory bird nesting surveys will be performed no more than 2 weeks (14 days) prior to any project-related activity that could pose the potential to affect migratory birds, including site preparation. If a lapse in project-	All Project elements, prior to construction	A qualified biologist retained by the SFCJPA will be responsible for the surveys described in this measure and for any needed consultation with other resource agencies.	Surveys will take place no more than 2 weeks prior to the onset of work.	For the construction period, the SCJPA's project manager will be responsible for ensuing proper implementation, for enforcement, and for documenting compliance. For the operational period, the SFCJPA's designated maintenance manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance. Protection measures will be identified in consultation with other resource agencies as necessary.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
related work of 2 weeks or longer occurs, another focused survey will be conducted before project work can be reinitiated. With the exception of raptor nests, inactive bird nests may be removed. No birds, nests with eggs, or nests with hatchlings will be disturbed.				
Mitigation Measure BIO-24- Establish buffer zones for nesting raptors and migratory birds. If an active nest is discovered during preconstruction surveys, the qualified wildlife biologist will establish a no-disturbance buffer zone around the nest tree (or, for ground-nesting species, the nest itself). The no-disturbance zone will be marked with flagging or fencing that is easily identified by the construction crew and will not affect the nesting bird. In general, the minimum buffer zone widths will be 0.5-mile for bald and golden eagles, 25 feet (radius) for nonraptor ground-nesting species; 50 feet (radius) for nonraptor shrub- and tree-nesting species; and 250 feet (radius) for all raptor species. Buffer widths may be modified based on discussion with CDFW and USFWS, depending on the proximity of the nest to construction activities, whether the nest would have a direct line of sight to construction activities, existing disturbance levels at the nest, local topography and vegetation, the nature of proposed construction activities, and the species	All Project elements, prior to construction	A qualified wildlife biologist retained by the SFCJPA will be responsible for conducting the surveys described in this measure. If any active nests are identified, s/he will coordinate with CDFW and USFWS to establish buffers, will install or oversee the installation of exclusion fencing, and will determine when the nest(s) are no longer active.	Any buffers that are established as a result of surveys will remain in place as long as the nest is active or young remain in the area, as determined by the qualified wildlife biologist.	For the construction period, the SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance. Buffer zones will be established in consultation with CDFW and USFWS as necessary.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
potentially affected. Buffers will remain in place as long as the nest is active or young remain in the area. No construction presence or activity of any kind will be permitted within a buffer zone until the biologist determines that the young have fledged and moved away from the area and the nest is no longer active. If construction activities are within 10 feet of the active nest buffers, the biologist will monitor the nests to ensure birds are not being disturbed during construction activities. If disturbance from construction activities is affecting active nests, buffer widths will be increased until the disturbance no longer affects the nest(s). If the buffer cannot be extended further, then work within the area will stop until the nest is no longer active.				
Cultural Resources				
Mitigation Measure CULT-1- Conduct cultural resource awareness training prior to project-related ground disturbance and stop work if archaeological deposits are encountered during ground-disturbing activities. Prior to any project-related ground disturbance, SFCJPA will ensure that all construction workers receive training overseen by a qualified professional archaeologist who is experienced in teaching nonspecialists to ensure that contractors can recognize	All Project elements, prior to construction and groundbreaking	A qualified archaeologist retained by the SFCJPA will be responsible for conducting the construction monitoring described in this measure.	This measure will remain in effect for the duration of all ground-disturbing activities.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
archaeological resources in the event that any are discovered during construction. If tribal cultural or archaeological deposits are encountered during project-related ground disturbance, work in the area (100-foot radius) is to stop immediately. The onsite Native American monitor and onsite qualified archaeologist will assess and determine the path forward. Tribal cultural and archaeological deposits include, but are not limited to, flaked stone or groundstone, midden and shell deposits, historic-era refuse and/or structure foundations. If any human remains are discovered during ground-disturbing activities, an evaluation will be performed to assess likely age and provenance in a manner that is respectful of the disturbed remains. If determined to be, or likely to be, Native American, SFCJPA will comply with state laws regarding the disposition of Native American burials, which fall within the jurisdiction of the Native American Heritage Commission (PRC Section 5097). If human remains are discovered or recognized in any location other than a dedicated cemetery, there will be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until:				

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
1. The county coroner has been informed by SFCJPA and has determined whether investigation of the cause of death is required; and 2. If the remains are of Native American origin: a. The descendants of the deceased Native Americans have made a recommendation to the landowner or the person responsible for the excavation work for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in PRC Section 5097.98; or b. The Native American Heritage Commission was unable to identify a descendent or the descendent failed to make a recommendation within 24 hours after being notified by the commission. A solution that was employed upstream was the dignified transfer of remains to a location suitable to the Most Likely Descendent (MLD). The SFCJPA will work with our partners to determine the best solution acceptable to the Ohlone and Indian Canyon Mutsun Band of Costanoan tribes. According to California Health and Safety Code, six or more human burials at one location				

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
constitute a cemetery (Section 8100), and disturbance of Native American cemeteries is a felony (Section 7052). Section 7050.5 requires that excavation be stopped in the vicinity of the discovered human remains until the coroner can determine whether the remains are those of a Native American.				
Mitigation Measure CULT-2- Develop and implement a Tribal Cultural and Archaeological Testing Plan. Due to the presence of known tribal cultural and archaeological resources in the proposed work area, archaeological testing will occur prior to any ground disturbance to determine the extent of the resource as well as its significance under CEQA. The Tribal Cultural Archaeological Testing Plan (TCATP) will include the following steps/sections: • Background and anticipated resource types • Research questions that can be addressed by the collection of data from the defined resource types • Field methods and procedures • Cataloging and laboratory analysis • Findings and interpretation The TCATP will then be implemented prior to construction to help determine the extent of archaeological resources within areas where	All project elements, prior to construction	The SFCJPA will retain a qualified archaeologist that will be responsible for the testing plan described in this measure.	This measure will remain in effect for the duration of all ground-disturbing activities.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
there will be ground disturbance. The results of the study will be summarized into a technical document, compiled by a qualified archaeologist, who will determine whether further study is necessary. The technical document will also determine whether additional studies and/or mitigation will be needed. All technical documents will be submitted to the Northwest Information Center.				
Mitigation Measure CULT-3- Develop and implement a Tribal Cultural and Archaeological Monitoring Plan. Given the reasonable potential for tribal cultural and archaeological resources to be present within the proposed work area, the following measures will be undertaken to avoid any significant impacts on these potential resources. A Tribal Cultural and Archaeological Monitoring Plan (TCAMP) will be developed by a qualified archaeologist prior to any project-related ground disturbance to determine specific areas of archaeological sensitivity within proposed work areas. The TCAMP will determine whether an onsite Native American and qualified archaeological monitor is required during project-related ground disturbance. The TCAMP will include protocol that outlines tribal cultural and archaeological monitoring best practices, anticipated resource	All project elements, during construction	The SFCJPA will retain a qualified archaeologist that will be responsible for the construction monitoring described in this measure.	This measure will remain in effect for the duration of all ground-disturbing activities.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
types, and an Unanticipated Discovery Protocol (UDP). The UDP will describe steps to follow if unanticipated archaeological discoveries are made during project activities work and a chain of contact.				
Geology, Soils, and Paleontological Resources				
Mitigation Measure PALEO-1- Conduct a preconstruction paleontological resources field survey and paleontological resources inventory and evaluation. The SFCJPA will retain a qualified paleontologist with experience in vertebrate fossil monitoring and salvage at construction sites to conduct a paleontological resources field survey of the project area with native soils to determine whether significant resources exist within the project area. The inventory and evaluation will include the documentation and result of these efforts, the evaluation of any paleontological resources identified during the survey, and paleontological resources monitoring, if the survey identifies that it is necessary.	All Project elements, prior to construction groundbreaking	A qualified paleontologist retained by the SFCJPA will be responsible for conducting the survey. If salvage and/or protection are required, measures will be designed and implemented by the qualified paleontologist in consultation with the SFCJPA's project manager.	Surveys will be conducted prior to ground disturbance, and with enough lead time to allow for salvage and/or protection. If salvage or protection is needed, these operations will also be completed prior to construction ground disturbance.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.
Mitigation Measure PALEO-2- Conduct worker awareness training for paleontological resources prior to construction. Prior to the initiation of any site preparation or start of construction, the applicant will ensure that all construction workers receive training overseen by a	All Project elements, prior to construction groundbreaking	The SFCJPA will retain a qualified paleontologist or California-licensed professional geologist (PG) experienced in training non-specialists to deliver the required training.	Training will occur prior to groundbreaking.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
qualified professional paleontologist who is experienced in teaching nonspecialists, to ensure that forepersons and field supervisors can recognize paleontological resources in the event that any are discovered during construction.				
Mitigation Monitoring PALEO-3- Stop work immediately if paleontological resources are discovered inadvertently. If paleontological resources are discovered during ground-disturbing activities, work will stop in that area and within 100 feet of the find until a qualified paleontologist with experience in vertebrate fossil monitoring and salvage at construction sites can assess the significance of the find and, if necessary, develop appropriate treatment measures in consultation with the SFCJPA and other agencies as appropriate. Equipment operators, supervisors, inspectors, and other field personnel will be required to report to the paleontology monitor any suspected fossil discoveries. The paleontologist will have authority to halt or redirect excavation operations in the event of discovery of vertebrate, plant, or invertebrate fossils until such time as their probable significance can be assessed and, if potentially significant, appropriate salvage measures have been implemented.	All Project elements, during construction	Stop work orders may be issued by the qualified paleontologist, or by the construction foreperson in response to discoveries by construction workers. All SFCJPA and contractor staff will be responsible for adhering to stop work orders. Any follow-up (evaluation, treatment), will be performed by or under the supervision of the qualified paleontologist.	This measure will remain in effect for the duration of construction.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
The paleontologist will properly collect and document any large vertebrate remains and recognize and appropriately sample and document any sedimentary bodies revealing small vertebrate remains. Large bulk samples may be appropriate. Minimum documentation includes exact location (GPS data), orientation, depth (elevation), and detailed geologic setting of any large- or small-vertebrate finds, including detailed diagrams showing microstratigraphy in nearby excavations supplemented with good-quality field photographs. If vertebrate fossils are discovered in spoils piles during excavation, the paleontologist will make every effort to locate and record the original site of the specimen(s) prior to disturbance. Salvage of potentially significant specimens discovered in situ in excavated surfaces will be conducted by the paleontologist in compliance with all safety regulations and with implementation of all feasible precautions. The onsite safety inspector will hold final authority to determine whether each proposed salvage operation is consistent with established safety policies at the site. Excavation equipment and operators will be made available for short periods to remove overburden above in situ specimens, to improve safety conditions during				

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
salvage operations, or to aid in transport within the site boundaries of any large salvaged specimens which cannot be safely transported by hand. Any potentially significant fossils recovered during the monitoring and salvage phase will be cleaned, repaired, and hardened to the level required by the repository institution, and will be donated to that institution. Any collected bulk sediment samples having the potential for small fossil vertebrate remains will be wet- or dry-screened and processed as necessary for recovery of the included fossils. Requirements and conditions for transfer of salvaged specimens to the repository museum will be arranged with the identified repository museum as soon as the scope of the salvaged collection becomes apparent, and will be in accordance with the recommendations outlined in SVP's *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* (2010). On completion of the above tasks, the supervising paleontologist will prepare a final report on the implementation of this mitigation and results of implementing the mitigation and submit it to the appropriate parties, institutions, and government agencies.				
Greenhouse Gas Emissions and Climate Change				

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
Mitigation Measure GHG-1- Implement BAAQMD's best management practices to reduce GHG emissions from construction. • Use alternative-fueled (e.g., biodiesel electric) construction vehicles/equipment for at least 15 percent of the fleet; • Use at least 10 percent local building materials (from within 100 miles of the Project site); • Recycle at least 50 percent of construction waste or demolition materials.	All Project elements, prior to construction groundbreaking	The construction manager/foreperson will implement this measure.	This measure will remain in effect for the duration of construction.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.
Hazardous Materials and Public Health				
Mitigation Measure HAZ-1- Prepare and implement a Spill Prevention, Control, and Countermeasure Plan. The construction contractor would prepare and implement a Spill Prevention, Control, and Countermeasure (SPCC) Plan to minimize the potential for, and effects from, accidental spills of hazardous, toxic, or petroleum substances during construction and operation and maintenance activities of the project. The SPCC will be completed before any construction activities begin.	All Project elements, prior to construction groundbreaking	The construction manager/foreperson will implement this measure.	This measure will remain in effect for the duration of construction.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.
Mitigation Measure HAZ-2- Require proper storage and handling of potential pollutants and hazardous materials. The storage and handling of potential pollutants and hazardous materials, including, but not necessarily limited to, gasoline, diesel, oils, paint, and solvents, will	All Project elements, prior to construction groundbreaking	The construction manager/foreperson will implement this measure.	This measure will remain in effect for the duration of construction.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
be in accordance with all local, state and federal laws and other requirements. Temporary storage enclosures, double walled tanks, berms, or other protective facilities will be provided as required by law. All hazardous materials will be stored and handled in strict accordance with the Material Safety Data Sheets for each product. A copy of each Materials Safety Data Sheet will be submitted to the Project Engineer at the time of delivery of the products to the project site.				documenting compliance.
Mitigation Measure HAZ-3- Stop work and implement hazardous materials investigations and remediation in the event that unknown hazardous materials are encountered. In the event that unknown hazardous materials are encountered during construction monitoring or testing of soil suitability, work in the immediate area of the discovery will stop, and SFCJPA will conduct an investigation to identify the nature and extent of contamination and evaluate potential impacts in accordance with local and state requirements and guidance. If indicated based on the results of the investigation, the SFCJPA or designee will implement remediation measures consistent with all applicable local, state, and federal codes and regulations. Construction in areas known or reasonably suspected to be contaminated will not resume until remediation is complete. If waste disposal	All Project elements, prior to construction groundbreaking	The construction manager/foreperson will implement this measure.	This measure will remain in effect for the duration of construction.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
is necessary, SFCJPA will ensure that any hazardous materials removed during construction are handled and disposed of by a licensed waste-disposal contractor and transported by a licensed hauler to an appropriately licensed and permitted disposal or recycling facility, in accordance with local, state, and federal requirements.				
Mitigation Measure HAZ-4- Prevent mosquito breeding during project construction. To prevent mosquito breeding during project construction, SFCJPA will ensure that standing water that accumulates on the construction site is gone within 4 days (96 hours). All outdoor grounds will be examined, and unnecessary water that may stand longer than 96 hours will be drained. Construction personnel will properly dispose of unwanted or unused artificial containers and other obstructions (e.g., tires). If possible, any container or object that holds standing water that must remain outdoors will be covered, inverted, or have drainage holes drilled.	All Project elements, prior to construction groundbreaking	The construction manager/foreperson will implement this measure.	This measure will remain in effect for the duration of construction.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.
Hydrology and Water Resources				
Mitigation Measure HWR-1- Prepare an Adaptive Management Plan. SFCJPA will prepare an Adaptive Management Plan with respect to stream erosion within San Francisquito Creek at the five erosion	All Project elements, prior to construction	The SFCJPA will prepare an adaptive management plan.	This measure will remain in effect for the duration of construction, as well operation and	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
monitoring sites within Reach 2. The Adaptive Management Plan will be developed based on field inspection/observations and quantitative monitoring/qualitative assessments. The objective of the Adaptive Management Plan will be to ensure that the improvements proposed as part of the project within the San Francisquito Creek are monitored in order to evaluate changes in erosion of the streambed and streambanks. This will include evaluating assessments of recorded stream data in order to evaluate the performance of the channel system, as well as identification and implementation of erosion control protection, as determined is needed in the Adaptive Management Plan. The Adaptive Management Plan will include a detailed description of the following components: • Management objectives: The overall objective of the Plan is to identify bank instability that would affect nearby infrastructure, including houses. Site-specific objectives also will be identified at the designated monitoring sites, as needed. • Monitoring locations and methods: Monitoring under the Plan at erosion sites specified due to their proximity to			maintenance of the Project.	documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
residences and infrastructure will identify the potential for erosion following storm events over 5,800 cfs to threaten the integrity of infrastructure at top of bank. Monitoring will also determine which actions would be appropriate to address the erosion. Specific monitoring methods would be determined as appropriate for each given site. • Adaptive management triggers: In general, the detection of streambed instability will trigger the need for management action. Specific triggers for implementation of management actions will be identified by monitoring at the 5 specified sites. • Management actions: Erosion control actions may include revegetation, installation of rock toe protection, geotech mats to prevent damage to infrastructure at top of bank, or other options deemed feasible and effective to avoid damage to Creekside structures at a given site. An adaptive approach to the monitoring program will be applied that fulfills the following purposes: • Establish well-defined monitoring program to:				

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
○ Identify trends of the creek within and downstream of the project. ○ Evaluate the response of the creek system to storm events over 5,800 cfs. ○ Assess long term streambed and streambank stability or instabilities. ○ Monitor impacts on applicable public and private structures within the creek system. The monitoring program will include, at a minimum, (1) a list of the sites to be monitored; (2) methods for monitoring each site, including monitoring frequency and the location of monitoring stations; and (3) an explicit timetable for the monitoring program including data collection, data analysis, and reporting of results • Application of qualitative and quantitative geomorphic and engineering techniques for evaluation of collected data. • Identification of an action plan to implement interim and long-term erosion control measures for erosion sites that are exacerbated as a result of construction of the proposed project.				

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
• Ongoing monitoring to determine the effectiveness of the Adaptive Management Plan. SFCJPA will work with landowners and responsible agencies to identify and implement appropriate erosion treatments or actions. The Adaptive Management Plan will be prepared by the SFCJPA prior to the start of construction activities and shall continue until long-term bank stability is achieved. If accelerated erosion is identified during project operation, SFCJPA will work with landowners and responsible agencies to identify and implement appropriate erosion treatments such as revegetation and/or installation of rock toe protection.				
Noise and Vibration				
Mitigation Measure NV-1- Provide advance notification of construction and operations schedule and 24-hour hotline to residents. SFCJPA will provide advance written notification of the proposed construction activities and major operational activities (i.e., debris removal) to all property owners and occupants and other noise-sensitive receptors within 1,000 feet of the construction or operations site. Notification will include a brief overview of the proposed project and its purpose, as well as the proposed construction	All Project elements, during construction	SFCJPA staff will implement this measure at the direction of the SFCJPA project manager.	Advance written notification of proposed construction activities will be provided at least 1 month and not more than 3 months in advance of site work. The 24-hour hotline will be in operation for the duration of construction at each site, including site	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
activities and schedule. It will also include the name and contact information of SFCJPA's project manager or another SFCJPA representative or designee responsible for ensuring that reasonable measures are implemented to address the problem (the construction noise; see MM-NV-3).			finishing and demobilization.	
Mitigation Measure NV-2- Designate a noise disturbance coordinator to address resident concerns. SFCJPA will designate a representative to act as construction noise disturbance coordinator, responsible for resolving construction and operations noise concerns. The disturbance coordinator's name and contact information will be included in the preconstruction notices sent to area residents (see MM-NV-2). The coordinator will be available during regular business hours to monitor and respond to concerns; if the extension of construction hours would be required for some project components as determined by both the contractor and SFCJPA, the disturbance coordinator will also be available during the extended hours. In the event a noise complaint is received, she or he will be responsible for determining the cause of the complaint and ensuring that all reasonable measures are implemented to address the problem.	All Project elements, during construction	The SCJPA's project manager will designate a noise disturbance coordinator. The noise disturbance coordinator will be responsible for receiving and responding to noise complaints, and will coordinate with the SFCJPA project manager to implement timely solutions.	This measure will remain in effect for the duration of Project construction. Resolutions to noise complaints will be provided as rapidly as possible.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
Mitigation Measure NV-3- Install temporary noise barriers where possible. As described in MM-NV-2 and MM-NV-3, SFCJPA will notify noise-sensitive land uses near the site of upcoming activity before construction or operations activity begins, will require construction-site noise reduction measures, and will provide a 24-hour complaint hotline. If a resident or other noise-sensitive person submits a complaint about construction or operations noise and SFCJPA is unable to reduce noise to a level that does not cause annoyance or disruption to adjacent land uses through other means, SFCJPA will install temporary noise barriers to reduce noise levels below the applicable construction noise or powered equipment standard. Barriers will be installed as promptly as possible, and work responsible for the disturbance will be suspended or modified until barriers have been installed. SFCJPA would be responsible for ensuring that noise barriers are installed immediately in response to noise concerns from the community. The following minimum criteria will be required of the contractor: • The barrier will be 10 feet tall. It will surround the work area to block the line of sight for all diesel-powered equipment on	All Project elements, during construction	Noise barriers will be installed by contractor staff at the direction of the SFCJPA project manager.	This measure will remain in effect for the duration of construction.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
the ground, as viewed from any private residence or any building. • The barrier will be constructed of heavyweight plywood (5/8 inch thick) or other material providing a Sound Transmission Classification of at least 25 dBA. (Note that 5/8 inch is sufficiently thick to provide optimal noise buffering; increasing the thickness of the barrier above 5/8 inch would not provide a noticeable improvement in noise reduction.) • The barrier will be constructed with no gaps or holes that would allow noise to transmit through the barrier. • To minimize reflection of noise toward workers at the construction site, the surface of the barrier facing the workers will be covered with a sound-absorbing material meeting a Noise Reduction Coefficient of at least 0.70. The sound-absorbing material on the barriers is not required if workers at the construction site are required to wear hearing protection that offers an equal level of sound reduction. • The barrier would be installed in a location that is functional but avoids impacts on trees, habitat, or line of sight for vehicles.				

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
Mitigation Measure NV-4- Conduct construction vibration monitoring and implement control approach(es). During periods of construction, SFCJPA will retain a qualified acoustical consultant or engineering firm to conduct vibration monitoring at homes or occupied vibration-sensitive buildings located within 100 feet of pile driving locations and 25 feet of construction sites using other non-impact equipment. Vibration monitoring will be conducted on each day of construction until it can be determined that all affected structures would not experience significant groundborne vibration. If a structure would not experience significant vibration at a distance of 50 feet from pile driving activities, on subsequent days, when construction activity would occur farther away from that structure, vibration monitoring would not be required. If at any point the measured Peak Particle Velocity (PPV) is in excess of 0.2 in/sec, the vibration damage threshold for normal residences from continuous, frequent, or intermittent sources, construction activity will cease and alternative methods of construction and excavation will be considered to prevent possible exposure of vibration-sensitive buildings and structures to levels of 0.2 in/sec PPV or higher. Prior to construction activity, and assuming the property owner gives	All Project elements, during construction	A qualified, state-licensed geotechnical engineer retained by the SFCJPA, or by the construction contractor, will conduct the vibration monitoring and assessment. If modifications to Project design are required to meet the thresholds in this mitigation measure, they will be developed by the design team in consultation with the geotechnical engineer.	This measure will remain in effect for the duration of construction.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
permission, a preconstruction survey will be conducted that documents any existing cracks or structural damage at vibration-sensitive receptors located within the distances identified above by means of color photography or video. Additionally, a designated complaint coordinator will be responsible for handling and responding to any complaints received during such periods of construction. SFCJPA will also implement a reporting program that documents complaints received, actions taken and the effectiveness of these actions				
Traffic and Transportation				
Mitigation Measure TT-1- Require a temporary traffic signal at Middlefield Road/Woodland Avenue-Palo Alto Avenue. San Francisquito Creek Joint Powers Authority (SFCJPA) will provide a temporary traffic signal at Middlefield Road/Woodland Avenue-Palo Alto Avenue for the duration of the closure of the Pope-Chaucer Bridge. This temporary traffic signal should be coordinated with the traffic signal on Willow Road at Middlefield Road due to the close proximity between the two signals.	All Project elements, prior to and during construction	SFCJPA, construction contractors	Prior to closure of Pope-Chaucer Bridge for demolition and replacement and will remain in effect until traffic operations resume over the new bridge.	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for documenting compliance.
Mitigation Measure TT-2- Require a site-specific traffic control plan A site-specific traffic control plan will be developed to minimize the effects of construction traffic on surrounding roadways. The plan will be	All Project elements, prior to and during construction	The SFCJPA's project manager will liaise with the Cities and Caltrans during Project design to identify issues that should be addressed	Coordination with local jurisdictions will be initiated before any construction activity beings, and will remain in effect	The SFCJPA's project manager will be responsible for ensuring proper implementation, for enforcement, and for

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
prepared with oversight by a licensed traffic engineer, with input from the cities of Menlo Park, East Palo Alto, and Palo Alto to ensure that all concerns are appropriately addressed. The plan will be subject to review and approval by the Cities of Palo Alto, Menlo Park and East Palo Alto. SFCJPA will be responsible for ensuring that the plan is effectively implemented. The traffic control plan will include, at a minimum, information regarding working hours, allowable and restricted streets, allowable times for lane closures, emergency vehicle access, detours, and access to private and public properties. All construction traffic control plans will contain, at a minimum, the following general requirements: • Restrict work site access to the roadways indicated on the traffic control plan. • Prohibit access via residential streets unless expressly approved by the City with jurisdiction. • Maintain two-way traffic flow on arterial roadways to active work areas to accommodate construction of project facilities, unless otherwise allowed by the City with jurisdiction.		in the site-specific traffic control plan for each work site, and will oversee contractors developing the individual plans. Each plan will be developed with oversight from a licensed traffic engineer. All SFCJPA and contractor staff will adhere to the plans.	for the duration of the Project. The traffic control plan for each site will be completed and approved by the local jurisdiction prior to groundbreaking; draft traffic control plans will be submitted for review and approval for each work site. Traffic control plans will be in effect for the entire duration of construction at each site.	documenting compliance. The local jurisdiction for each work site will have review and approval authority over the applicable traffic control plan.

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
- Provide 72-hour advance notification to affected residents or businesses if access to driveways or private roads will be affected. Limit effects on driveway and private roadway access to working hours and ensure that access to driveways and private roads is uninterrupted during non-work hours. If necessary, use steel plates, temporary backfill, or another accepted measure to provide access. - Provide clearly marked pedestrian detours to address any sidewalk or pedestrian walkway closures. - Provide clearly marked bicycle detours if bicycle route closures would occur or if bicyclist safety would be compromised. - Provide crossing guards and/or flaggers as needed to avoid traffic conflicts and ensure pedestrian and bicyclist safety. - Use non-skid traffic plates over open trenches to minimize hazards. - Locate all stationary equipment as far away as possible from areas used by vehicles, bicyclists, and pedestrians. - Notify and consult with emergency service providers, and provide emergency access by whatever means necessary to expedite				

Mitigation Measure	Required for the Following Sites/Project Phases	Implementation Responsibility	Implementation Timing	Monitoring, Enforcement, and Reporting Responsibility
and facilitate the passage of emergency vehicles • Queue trucks only in areas and at times allowed by the City with jurisdiction. • Provide adequate parking for construction related vehicles and equipment within the designated staging areas throughout the construction period. If inadequate space for parking is available at a given work site, provide an off-site staging area at another suitable location, and coordinate the daily transport of construction vehicles, equipment, and personnel to and from the work site as needed. • Fences, barriers, lights, flagging, guards, and signs will be installed as determined appropriate by the public agency having jurisdiction to give adequate warning to the public of the construction and of any dangerous condition to be encountered as a result thereof.				